VOLUME I. AUGUST, 1903. NUMBER 1.

8/71.

The American Journal *of* Orthopedic Surgery

BOSTON MEDICAL LIBRARY. JUL 26 1904

I.
THE PRESIDENT'S ADDRESS.

THE FAMILY PHYSICIAN, THE SPECIALIST AND THE PATIENT.

LOUIS A. WEIGEL, M.D., ROCHESTER, N.Y.

In calling the seventeenth annual meeting of the American Orthopedic Association to order, I must give voice to my appreciation of the supreme confidence manifested by conferring the highest honor within its gift upon me. To be called upon to preside over the deliberations of an association of international importance carries with it a grave responsibility; and I trust that, when this year's work has passed into history, I may have honestly earned the approbation of my fellow-members, and that the work done by them may have truly fulfilled the purpose of the Association, which, our Constitution tells us, should be "the advancement of orthopedic science and art." To those members who so generously came to the assistance of the President and furnished the scientific material for this year's meeting I tender my especial thanks.

My predecessors in office, in their annual addresses, discussed various phases of orthopedics, both American and foreign, its rank as a specialty, its past and future, its scope, its influence, its pathology, its institutions, its education and literature.

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

As the ground within the specialty has been so thoroughly covered, it may be well to go outside of our own comparatively narrow sphere and consider briefly our relations and duties to the family physician and the patient.

The good old family doctor seems almost destined to disappear completely, and unfortunately so. As a recent writer says:* "Families have three or four doctors,—one for the grown people, one for the children, and so on. If I ask you whether you think that the specialist can fulfil every requirement that sick people need, I am sure you will agree that he cannot. He is good for one thing. He does not have general influence, nor does he have the power of mental influence on the patient. The family doctor combines the offices of a father confessor and a general adviser on very many subjects. We ought to call a specialist sometimes; but we must have the family doctor as well, in order to understand the constitution or diathesis, and to develop a true roundness of character in treating disease." It is undoubtedly true that the specialist or any number of specialists cannot take the place of the family adviser. It may be that the influence of the family physician is less potent than formerly, but this decline cannot be attributed to the growth of specialism. While this may be one of the causes, it is not the only one. In these days, where we have a multiplication of pathies, fads, patent medicines, etc., it is not strange that the practice of medicine has been pretty thoroughly divided up, and that patients fly from one thing to another and from one doctor to another without rhyme or reason. Of course, present-day fads are simply a repetition of history. The days of tar water, Perkins tractors, etc., are replaced by Christian Science, osteopathy, etc. The daily press, too, has assumed the rôle of teaching the public in matters medical, and its influence in spreading knowledge or error is certainly a very potent one. The conditions in the home even have undergone a great change. With the decadence of the family physician, the school of practical hy-

*D. W. Cheever, the *Quarterly Bulletin of the Harvard Medical Alumni Association*, 1903, p. 452.

giene and medicine has passed from the home circle and been transferred to the newspaper and magazine,—certainly a change of questionable character. In some communities public health associations are established to give reliable instruction in matters pertaining to health, but their influence must necessarily be limited unless supplemented by personal instruction on the part of the family doctor, who may individualize and adapt conditions to surroundings. General rules cannot be made applicable to the individual.

At the present day the requirements and attainments of the ideal family doctor are somewhat different than they were formerly. Even though he may not think it advisable to undertake the treatment of every case or every condition that comes under his notice, he should, at least, be competent to make a reliable diagnosis, but it is a matter of daily observation that in this respect he is somewhat at fault. We all of us know how frequently patients come to us with the statement that their family physician had been treating them for months, perhaps years, and during that whole time never thought it necessary to make a physical examination. Many anxious mothers are consoled with the statement that an incipient deformity or distortion does not amount to anything and that the child will outgrow it, when, as a matter of fact, the tendency of such deformities or distortions is to increase with advancing years. Palpable conditions are overlooked or mistaken because of the neglect to have the patient undress for a proper physical examination. Only recently a child thirteen years of age was presented who was said to have spinal trouble which she would outgrow in time without treatment, and which, upon proper investigation, proved to be a case of double congenital dislocation of the hips. It is not necessary for me to multiply instances of this kind, as you are only too familiar with them. When patients have taken drugs or other treatment for months without obtaining the relief sought for, it is not surprising that they finally seek the services of quacks and charlatans, who would not receive the same degree of support from the public if the family doctor were more

painstaking and conscientious in examination and treatment. Quackery thrives largely on the shortcomings of the medical profession and the limitations of medicine itself.

While we are justified in accusing the family physician of sins, both of commission and omission, it may be proper for us to make an examination of conscience and see where we ourselves are at fault in our relation both to him and the patient. It cannot be denied that working along one special line has a tendency to narrow our point of view, and sometimes to the detriment of the patient. The family physician who is not thus hampered and whose field of vision is necessarily very much broader may frequently give us material help in solving some perplexing problems. A judicious co-operation would inure many times to the benefit of all parties concerned.

A word may be said with reference to the education of the specialist. The specialist is not made in a day, nor can he be evolved from a medical college. Although there is a tendency in modern times to send full-fledged specialists into the world directly from college and university,—and a few of the influential medical journals advocate such a course,—I am still old-fashioned enough to believe that the specialist to be successful requires something more than the knowledge he gains at school. Even granting that the science and art of medicine of to-day is almost too great to be mastered by a single individual, one cannot become a broad and liberal-minded specialist before he has had the inestimable advantage of a general practice. A period of experience in a hospital or any other institution can never be considered an equivalent. At the bedside of the patient, in a private house, where the young physician is thrown upon his own responsibility, where he must struggle to make his own diagnosis, watch every symptom and be prepared for an emergency, he receives a training both of the mind and of the eye that can be acquired in no other way. After a period of probation and study of this character sufficiently long to develop the powers of perception to the highest degree, one is better fitted to confine his

efforts to some special line of work and with a greater chance of success. It may be said that a specialist, like a poet, is born and not made. Certain qualities and aptitudes are innate, and are acquired with difficulty. It is not an uncommon experience for men to have certain fixed ideas of what they are especially fitted for. In the course of a few years, however, either by force of circumstances or by certain accidents, they drift away entirely from their preconceived ideals and engage in activities that perhaps they never dreamed of. For this reason, if for no other, a general practice becomes a necessity to bring out the special qualifications of a given person and demonstrate for what he is best fitted. As Dr. Cheever,* in an address, well says: "I feel that the specialist is not so useful if he began as a specialist, and never did anything else, as he would be if he had begun as a general practitioner, and had not only learned the general round of professional work by study, but had also practised it. It used to be said that a doctor ought to have ten years of general practice before he became a specialist. Perhaps that is not strictly true as to time, but the principle is true. I have been struck with this over and over again quite forcibly. I recall cases where the specialist was of great use to me in differentiating the disease of a single organ; but, as time went on and the case developed, I could not help noticing the fact that he saw that organ and nothing else, and that the patient's general condition was not so clearly present to his mind as it was to mine. It seems to me that the doctor's position is this: that the specialist is the person who is supposed to develop an unusual amount of knowledge on a limited theme. If he is called in simply to give treatment or to aid diagnosis on that little point, perhaps that will do; but it may do harm if he sees that one portion and overlooks the rest. He does not see justly. So I am more than ever convinced of the fact that, although young men who have settled in cities may be expected to have an unusual amount of knowledge and to be called in as experts, yet I am sure that in small communi-

* *Loc. cit.*, p. 451.

ties the general practitioner is and always will remain the doctor."

It is incumbent upon this Association to promote a development and improvement of orthopedics by insisting upon the proper qualifications of men who are to take up this specialty. We should take special care in selecting candidates for membership, so that only those who show the greatest amount of special aptitude, in addition to a general knowledge of medicine, shall become associated with us. If we require of the family doctor that he be sufficiently well versed in all branches of medicine to make a diagnosis at least, we, on the other hand, should also be sufficiently well educated in general medicine to give proper weight to all conditions that may modify the treatment of a special case. This is surely not too much to expect of us. Perhaps the specialist of to-day may be defined as one who has given special attention and study to one branch of medicine in *addition* to a general knowledge of all other branches, such knowledge to be based on practical experience at the bedside in the home for a sufficient length of time to broaden the mind and to train his powers of observation and self-reliance. There are many things to be learned outside of the laboratory.

In my triumvirate I have placed the specialist in the middle, because he should form the connecting link in the chain of mutual confidence between the family physician and the patient, and also because he must sometimes act as a buffer to lessen the shock of a possible collision between them. There need not necessarily be any conflict between the family doctor and the specialist, and there would be a better feeling of fellowship between them if they co-operated more frequently in the treatment of a patient. I am afraid that we do not always follow up our patients sufficiently well to know the final result of our treatment. This is especially true of operative work. If we paid more attention to the subsequent history of the patient than to the immediate success of an operation, I am inclined to believe that we would many times change our views and modify our methods of treatment. The family

physician, who is able to keep a patient under observation for a long time, is best fitted to aid us in this direction.

Medicine is classed as a liberal profession, but, unfortunately, many of its members are illiberal and bigoted. At times there is a lamentable absence of the *esprit du corps*. Narrow-mindedness and bigotry are responsible for many petty jealousies that do not benefit the patient, the one most vitally interested in the success of medical practice. Active co-operation, mutual confidence, and the practice of the Golden Rule certainly should mark the relation between the family doctor and the specialist. The charge has been made that loyalty to the family physician has been impaired by specialism, and given rise to hesitation and distrust of the family doctor. I am not inclined to agree with this sentiment, for I believe there are other and more potent causes to account for the apparent decadence of the family doctor.

The human mind is so constituted that it is always striving after the marvellous, the wonderful, and the unusual, while the commonplaces of every-day life attract no attention whatever. This was illustrated in the recent visit to this country of one of our corresponding members, which gave occasion to a newspaper discussion of orthopedics. You all know how assiduously and eagerly the public devoured the sensational stories, and accepted every statement as gospel truth, no matter how improbable or exaggerated it may have been. I simply refer to this to show how much the public is interested in medical matters, and how easily it is swayed in one direction or another. There is no question that our specialty has derived a direct benefit from the newspaper discussion, but it remains for us to educate the public as to what may be done and what may be impossible in orthopedic surgery. We may not be able to impress some people by our prosaic methods, but this should not deter us from dealing honestly and conscientiously with all who come under our care. In giving our best thought and attention to the patient, and seeking the co-operation of the family physician in all important matters, we will in return secure a degree of confidence that could

not otherwise be attained; and, even though our best efforts may not always be appreciated at their true worth, we can, at least, have the consciousness of having done our duty.

Since our last meeting we have suffered the loss of an active member and a former president of the society. It is not necessary for me to write an elaborate eulogy of Dr. Abel Mix Phelps, because his work, his originality, and his contributions to scientific surgery are an enduring monument. The members of the Association who came in intimate contact with him fully appreciated his force of character. Although impetuous in the extreme, there was an element of kindness in his nature that was not generally known. There were many sides of his character that are worthy of emulation.

II.

THE CORRECTION OF DEFORMITY AT THE HIP, THE RESULT OF DISEASE: A STUDY OF THE BEST METHODS AND BEST POSITIONS.

VIRGIL P. GIBNEY, M.D., NEW YORK.

When Mr. Gant, the English surgeon, advocated subtrochanteric osteotomy for the correction of deformity resulting from hip disease, this operation was regarded as a distinct improvement over that advocated by the late Mr. Adams; namely, osteotomy through the femoral neck. For some years orthopedic surgeons have been operating after Gant's method, and papers with elaborately compiled statistics have been presented from time to time to the American Orthopedic Association. While some of our fellows have not been fully satisfied with the results of the operation, I think that it might be safe to say that the majority have looked upon this simple subcutaneous osteotomy about the level of the trochanter minor as the safest procedure extant for the correction of deformity at the hip. It is certainly within the experience of the writer of this paper to have encountered disastrous results from either the subcutaneous or the open operations through the joint; and, while a faulty technique may be the cause of some of the results, he, at least, prefers the Gant operation.

During the month of December, 1902, Professor Lorenz, in a paper read before the Orthopedic Section of the Academy of Medicine, advocated the "centric" correction of deformities of the hip, and he was so positive in his assertion that this was far preferable to the "excentric" that it has occurred to the writer that a discussion would not be inopportune or out of order. Hence this paper.

It is not intended to present an array of statistics, but to discuss the question from a clinical standpoint.

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

Case 1.—A girl, L. G., nine years of age, was admitted to the Hospital for Ruptured and Crippled on February 24 of the present year. She had been under treatment in the Out-patient Department for a long time, and had previously been under treatment in the Post-graduate Hospital. Suffice it to say that a year before her admission to our hospital the disease was regarded as fully arrested, and the little deformity was considered as of no consequence. Shortly before her admission she began to walk poorly, and we found the hip pretty well locked, and that movements excited a little spasm. It was thought, however, that the ankylosis was fibrous; and, in view of the absence of any symptoms about the hip, she was on March 3 anæsthetized and subjected to forcible correction of the deformity by manual force. The joint was not moved, as in *brisement forcé*, but the pelvis was steadied and the limb pulled down into a good position, and the usual plaster of Paris bandage was applied for maintaining the correction. She rested poorly that night, and we were obliged to keep her in bed for about four weeks on account of a daily temperature and pain on handling. The plaster was removed on April 2, and the parts were found to be quite sensitive, yet there were no signs of abscess. She had lost flesh. Traction was employed temporarily, but on the 6th there was just enough tension above the trochanter major to suggest an aspiration, which was made with the large needle with negative results. The high temperature continued, ranging from 99° F. to 104° F. until the 20th, during which interval she had a good many night cries. Under an anæsthetic, on this date, an incision was made into the joint just above the trochanter, when some thickened pus and diseased bone were removed with a curette. The joint was pretty thoroughly emptied, and the wound closed with catgut without drain, and plaster of Paris was applied. Her improvement dated from that operation. She has not had any night cries since, the temperature has fallen to normal, and on April 30 the report is that her condition is all that can be desired.

Now this case is at least suggestive of damage done to tissues undergoing repair and the lighting up of the old inflammatory process, and it would seem that the operation for the relief of the joint tension was opportune. Taking into account the extremely sensitive condition induced by the forcible correc-

tion and the persistence of the temperature, it is fair to assume that an abscess with extensive suppuration would have resulted; and all this is traceable to the bloodless operation resorted to at the time of her admission.

On the other hand, there are cases innumerable where the same amount of force has been employed, the same correction secured, without any untoward symptoms. But the case I have cited is not a solitary one, and at the hospital we have long since learned that it is unsafe to resort to forcible correction where sinuses lead to the joint, no matter how long-standing these may be. Indeed, we hesitate to do a subtrochanteric osteotomy for fear that the osteotome may invade a focus of disease more or less active.

One is ready to admit that a longer limb can be secured by the "centric" correction, but one must also admit that it is exceedingly difficult to determine when a joint is ready for the employment of force enough to correct fully. Even if the forcible correction at the joint is always devoid of risk, the pathological dislocation and the destruction of the head and neck preclude the possibility of a limb as long as its fellow, and it may be asserted that the little difference in favor of a lengthened limb is hardly a good enough reason to make this an operation preferable to the osteotomy below the joint. Certain it is that many of the most satisfactory results, so far as improving the length of the limb is concerned, have been accomplished by subtrochanteric osteotomy. It is the experience of many who have collected statistics from the Hospital for Ruptured and Crippled to find a certain number of relapses after subtrochanteric osteotomy. It is also the experience of these gentlemen that relapses occur just about as frequently after forcible correction through the joint. It may be that our retention apparatus has not been sufficiently long employed, and the results obtained by Professor Lorenz may be due to prolonged use of plaster of Paris after the operation. It has long since been our conviction at the hospital that the plaster of Paris was not used long enough, and within the past two or three years it has been our custom to maintain

this correction over long periods of time, say from three to six months.

The following case is one where relapses have occurred after osteotomies below the trochanter:—

Case 2.—A boy, now fifteen years of age, was admitted to the hospital in October, 1897, for the correction of deformity after hip disease. A day or two later the deformity was corrected by division of the adductors and the tensor vaginæ femoris and forcible correction. Plaster of Paris was employed, and on October 26 it was found, on removing the plaster, that the deformity was not fully corrected, so another attempt was made under an anæsthetic. On November 10, same year, the deformity had recurred in spite of the plaster of Paris; and the hip was stretched under ether, so that 180° was measured before the plaster was applied. On November 20, on removing the plaster, the best that could be had was 165°. In January, 1898, the deformity had increased while wearing a hip splint with thoracic attachment, and the best that could be had was 145°. So on the 12th an osteotomy through the trochanter minor, subcutaneously, was performed, the deformity being fully corrected. Plaster of Paris was employed, and on the following day he developed measles, and was taken to the Reception Hospital. On his return, at the end of a week or ten days, it was noted that the deformity was still 155° in extension. On August 4, 1898, his angle of deformity was still 155°, and he had suffered no inconvenience from any of the stretchings or operations. On January 7, 1899, an attempt was made to correct the deformity without an osteotomy, an angle of 175° being obtained. The plaster was removed on January 28, and a brace applied, 165° being the record at this time. He went into the country, and on May 3 he returned with two discharging sinuses, these having occurred in old cicatrices. At this time his angle of deformity was 160°. By July 26, 1899, it had reached 150°. He was discharged finally from the hospital on November 15, 1899, the sinuses having closed, and he was walking very well on a high shoe, but the limb was in deformity. He was readmitted May 31, 1901, his angle of deformity being 150° again. There was marked lordosis, and the trochanter was above Nélaton's line. On June 4 he had another osteotomy, Gant's, and he was kept in plaster until July 15. On July 20 measurements showed that his limb was down to 180°. The plaster was

not continued, but he wore a brace, and on November 20 the best that could be obtained was 145°. There had been no acute symptoms of any kind, and he was walking without apparatus. On November 26 the limb was stretched again under ether and the adductors divided subcutaneously, and on May 10, 1902, his angle was 150°. He was discharged from the hospital again, and on April 14, 1903, he was readmitted, and in a few days thereafter, the deformity being quite as marked as ever, a cuneiform osteotomy was done through the trochanter and what remained of the head and neck. The base of the wedge was 1½ inch, and, when the limb was brought quite straight, the cut surfaces of bone came in apposition. This patient, it will be seen, had about five or six stretchings under ether, two Gant's osteotomies, and one cuneiform osteotomy, the last; and it is proposed to keep him in plaster for several months.

It has been suggested that, if disease does occur after forcible correction, the symptoms are of slight import, and that fixation in a well-fitting plaster of Paris bandage is sufficient to guard against any serious relapse. The case already reported in this paper is one that fails to substantiate this argument. Again, a great many surgeons believe that tuberculous meningitis is directly induced by the forcible breaking-up of an old tuberculous focus about which repair has already been established, and statistics are inadequate to convince surgeons that such is not the case. Our own studies at the hospital, based upon numerous tables of statistics, have failed to show that there is any direct relationship between forcible correction and tuberculous meningitis. The cases that are sometimes adduced as evidence are those in which the second stage of tuberculous meningitis has developed too soon after the operation, or where the first stage has developed too long after the operation. Still, a certain amount of respect must be paid to the old adage, "It is a risky thing to disturb a sleeping dog."

The subcutaneous operation so favored by orthopedic surgeons has been so bitterly assailed by general surgeons that it may be well for us to discuss the relative merits of the open

and the subcutaneous operations. So simple an operation as subcutaneous achillotomy, done for so many years by orthopedic surgeons the world over, has been condemned by the general surgeon because, forsooth, a small vessel has been occasionally injured, and timid operators in this specialty have gone so far as to admit that the tendo Achillis should be divided by the open method. If the impetus given to bloodless surgery is to be productive of any good results, let us continue to resort to the subcutaneous division of tendons. There are a few orthopedic surgeons who claim that the tenotome is a valuable adjunct to our armamentarium.

If one does an osteotomy, it should, in the judgment of the writer, be a subcutaneous one, because the osteotome is just as tractable in the hands of a skilful operator as the tenotome. It serves as a probe or guide often, and one can tell whether he is in compact bony tissue or in spongy tissue. The instrument can be so directed as to avoid wounding anything more than the periosteum, and the little hemorrhage that takes place is of no account whatever.

The conviction has grown upon me that the position must be maintained for many months in a closely fitting plaster of Paris bandage. It is in evidence that recurrences have been due to short periods in plaster of Paris. When it is necessary to remove the plaster, then apply a closely fitting splint, like the Thomas, for several months afterwards. In some instances, an aluminum corset with a steel spring extending over the hip previously deformed, down the thigh acting as a lever, should take the place of the Thomas splint, but the principle is the same.

The question is often raised whether to have an ankylosed limb perfectly straight or slightly flexed. From my own experience in the management of these deformities I am convinced that the limb should be left as nearly straight as is possible. A certain amount of flexion will take place, but, if very slight, the patient certainly walks a great deal better and is in less danger of developing a painful hip in after years. Many cases of neuralgia of the limb or pain on walking have come

under my observation, and I have been able to relieve them by correcting the deformity. There are, undoubtedly, many patients who prefer a slight flexion, so that they may sit more comfortably, but these belong to the younger class. It is the opinion, therefore, of the writer of this paper that ability to sit comfortably should be sacrificed to the ability to stand and walk erect.

DISCUSSION.

Dr. A. J. STEELE reported the case of a boy of eight years who had been in the hospital for several months with extreme flexion of both hips from old hip disease. The speaker said he had been making gentle traction, hoping to get the hips down. Dr. Lorenz called special attention to this case, and insisted that it was an admirable one for carrying out Lorenz's theory. In accordance with this advice the resisting tissues were divided and the necessary force used. The immediate result was very gratifying; but a few weeks later fever and pain indicated that the old tubercular disease had been rekindled, and in a few weeks more the boy died of tubercular meningitis. He thought, therefore, that one should make haste slowly in these old tubercular joint troubles. His own experience was that there was danger of tubercular meningitis if extreme force were used in these cases.

Dr. RIDLON placed on record five cases which he had operated upon immediately after Professor Lorenz's visit to Chicago. There were five hips in three patients. In four of these hips, after cutting subcutaneously the adductors and long flexors, he was able by very great force to correct the deformity of flexion and adduction, and obtained as good a position as desired. In the other hip he used as great force as he dared, after having cut the flexors and adductors, but could not correct the deformity. All of the cases had no motion when the operation was attempted. All were old cases, and all had flexion deformity of about a right angle with some adduction. In the fifth case Lorenz's recommendation of driving the osteotome as close to the acetabulum as possible was followed. The bone was divided as freely as seemed necessary; and then with considerable force the remainder of the bone was broken, and the adductors and flexors were cut freely and the deformity corrected. All of the cases had lived, and the plaster had been removed from all. In all the deformity had remained corrected; and, to his amazement, in all there were from five to ten degrees of motion.

Dr. GOLDTHWAIT placed on record a series of sixteen cases operated upon during the past winter at the clinic, mostly in adults, because it had

been found that the relapses in adult life or after the age of seventeen were very much less frequent than in childhood. It had been their custom to keep the patients in a protection apparatus until this age was reached, and then operate. Among the adults there had been no relapses. Some of the pictures from these cases were exhibited.

Dr. SHAFFER referred to several cases in which forcible means were used to correct the deformity of old hip disease. One of the cases was regarded by the hospital surgeons as one of dislocation, the deformity being so extreme. The patient was not suffering much pain at the time. He was etherized, and the deformity corrected; and it was demonstrated that there was no dislocation present. He had no doubt that as a result of the manipulation an abscess was now forming. Another case was one in which under ether the deformity was reduced very much as described by Dr. Ridlon. Thus far the results were negative. There were no particular symptoms. While he was open to conviction regarding the propriety of performing this operation in advanced cases, he was yet to be converted, because he had seen so many disastrous results follow forcible measures used simply for the correction of deformity in old cases of hip-joint disease.

Dr. JOSEPH KURTZ, of Los Angeles (by invitation), spoke of the question of the open or the subcutaneous method of osteotomy. Personally, he had long practised the open method of osteotomy because it was quicker and safer. Dr. Gibney had made the statement that some surgeons were afraid of injuring certain important structures; but there was no occasion for this, and with modern aseptic methods there was no reason to fear infection. A large incision was not demanded. The periosteum should be cut down upon, and then peeled off. With the osteotome it was very easy to divide the bone to the desired extent. There was a chisel made which was guarded by a projecting edge. This was pushed in under the periosteum. With two or three strokes one could readily break through the bone more quickly than by the subcutaneous method, and it was much safer.

Dr. GIBNEY said he was glad that Dr. Goldthwait had brought up the question of relapses in adults. It accorded with his own experience that relapses seldom occurred in adults. The last speaker said there was no reason to fear infection. He sincerely wished this was strictly true, but his own opinion was that even the surgeon most skilled in aseptic technique did sometimes get infection. The plea had been made for the open method because of the shorter time,—an argument which did not appeal to him. Yesterday he had done two supracondyloid osteotomies for knock-knee and two osteotomies for anteroposterior curvature of the tibia, and the whole time consumed from the time of beginning the ether to the close was about thirty-five minutes.

III.

SUBTROCHANTERIC OSTEOTOMY IN ADULTS, IN ADOLESCENTS, AND IN YOUNG CHILDREN.

E. H. BRADFORD, M.D., BOSTON.

The fracture of so important a bone as the femur within a short distance of the pelvis in adults is a procedure not to be hastily undertaken. Non-union or delayed union is a possible consequence which would be deplorable. It is for this reason that a careful study of cases operated upon by this method is of value. From theoretical reasoning it would appear that the danger of non-union might be great from the fact that the operation is undertaken for deformity, and in the correction of deformity it is necessary to arrange for a union which would place the fragments of the bone at an angle. The distorted limb is usually flexed and abducted. In order that the resulting limb should be well under the patient, it is necessary that the lower fragment should be in the longitudinal axis of the body, leaving the upper fragment in its former distorted position. This causes considerable angle of the fragments. A union, therefore, must take place in a distorted position, and the first fear of a surgeon in undertaking the operation would be the possibility of non-union or of delayed union of bones in any except actively growing children.

From the following cases it would appear that this danger of non-union is not great. It is possible that the danger of non-union or of delayed union is less in artificial fracture by the use of the osteotome than after accident, from the fact that, if the operation is carefully done, the periosteum is not injured. There is also little probability of the interposition of muscular or fibrous tissues between the fragments. It is certain that in the cases which have come under my care there appeared to be no grounds for apprehension of non-union.

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

Case 1.—"P." A lady of forty-five years of age, of good health, with ankylosis at the hip joint, with a flexion of 80° and an abduction of 30°, dating from hip disease in early childhood. The patient was obliged by her occupation to stand constantly, which caused considerable pain about the hip, back, and thigh. This pain was most severe at the end of the day's work, and interfered seriously with the discharge of her duties, which demanded considerable activity. After careful consideration of the danger from the operation, subtrochanteric osteotomy was decided upon and performed. The operation was done in the usual way. The division of the bone was slightly oblique. No traction force was used, but the limb was placed in plaster with the flexion entirely corrected. The limb was abducted to 45°. Plaster of Paris was applied, and the patient placed in bed, secured by a bed frame. No reaction followed the operation, and her recovery began without interruption for two weeks. At this time a digestive disturbance was occasioned by extreme hot weather and slight error in diet. The patient was somewhat weakened by this, and nervous prostration followed, partly due to the reaction of the operation, partly to the confinement in bed of an active woman, and partly to the reaction which followed the over-activity and overwork previous to the operation. This condition lasted for the following three months. The union of the osteotomized femur, however, was firm at the end of two months, and the plaster was removed, but the patient was unable to walk about until three months later, and it was six months from the operation before the patient was able to resume her occupation. There has been no relapse, and a shrinking from the position of abduction only to about 10°, making the length of the limbs equal where previously there had been an actual shortening of an inch and a half, and a practical shortening, owing to the deformity and tilting of the pelvis, of four inches. The recovery has remained permanent without relapse for three years.

Case 2.—"S." Aged forty years, a school-teacher, stout and nervous person, with a deformity at the hip, with, however, a few degrees of motion at the hip joint. The limb was held in a position of flexion and abduction, with a practical shortening of three inches. Osteotomy was performed as in the previous case, with a more rapid and immediate recovery. The patient was able to return to her home from the hospital after two months. The plaster was removed, and

the union seemed firm. Some nervous disturbance followed. Was unable to walk until nearly six months after the operation. She took up her occupation as school-teacher a year after the operation. The recovery has been complete, and the patient is now able to walk without difficulty.

Case 3.—"C." Patient twenty-five years of age. Hip disease with ankylosis and moderate deformity, with a practical shortening of three inches. Osteotomy was done in the ordinary way, and the patient made a good recovery in two

Tracing from a skiagram one year after subtrochanteric osteotomy, showing angle in the shaft of femur after correction of deformity.

months, and was able to walk without crutches in three months from the operation. The patient was light and active. No relapse occurred. A shrinking in a position of forced abduction from 45° to 20° followed, but enough was left to maintain the equality of the limb.

Case 4.—"G." An active young gentleman, twenty-one years of age. Had grown rapidly, and was tall and slight, with a bad right-angled contraction and 10° of abduction at the right hip. Osteotomy was done, the limb being placed in a position of forced abduction. The case, however, was allowed to move about at the end of two months, and a loss of abduction resulted, so that the legs became parallel. Six months later a second operation was done, and a position of

abduction again secured. This position remained, the patient being kept in bed for three months. The deformity was complicated, however, by a condition of knock-knee, which was found to have existed, making locomotion difficult, and an osteotomy at the lower end of the femur (McEwen's operation) correcting the knock was performed. This made the walking almost normal, and locomotion remained without noticeable limb and deformity. The cure has remained perfect for five years without relapse.

Case 5.—"R." A girl of eighteen, slight of figure. Suffered from hip disease in early childhood with the characteristic deformity, including marked shortening. Osteotomy was performed in the usual way, and a position of forced abduction maintained. The patient was kept in bed for nine weeks, wearing a retentive leather apparatus for six months, locomotion with crutches being permitted. No relapse has followed. The shortening has been entirely overcome.

It would appear, therefore, that non-union or delayed union is not to be considered in estimating the advantages to follow the operation.

The danger of recurrence of the deformity is also a factor of importance in judging of the ultimate value of the procedure. Where marked deformity exists following hip disease, to an extent to justify subtrochanteric osteotomy for the correction of the deformity, the conditions are usually of firm ankylosis at the hip joint, with a faulty position of the limb. The femur is strongly abducted and strongly flexed. There is a certain amount of actual shortening from the subluxation of the femur, from the absorption of the head and the enlargement of the acetabulum, and there is considerable degree of practical shortening. The functional benefit which is obtained from the operation consists not only in correcting the abduction, but in causing a union in a strongly abducted position, the amount of abduction being proportionate to the amount of practical shortening; for it will be readily seen that, if the limb which was abducted at 45° from the longitudinal axis of the body be abducted to a corresponding extent, the pelvis, which was tilted in such a way that the affected

side is raised, will, when the abduction becomes fixed by ankylosis, become tilted in exactly the opposite direction, and the well side will become the elevated one, and the lower side the one previously raised.

By this means it will be found that a shortening to the extent of three or even four inches can be overcome. It is evidently necessary that the union under these circumstances should be firm. Unless the pelvis adapts itself by the approach of the normal leg to the corrected position, the patient cannot walk. Either the well limb must be brought to the new position, or the limb operated upon will return to its former distortion. There is, therefore, a constant tendency for the limb to fall back into its former position, not so much from muscular action of the adductor muscles as from the constant pull of the weight of the leg, and the constant tendency on the part of the patient to bring the leg toward the median line. It would appear that this tendency to relapse is greater in children than in adults, probably for the reason that in growing bone the ossification and union of fractures is less of a bony character, or that the ligamentous union remains longer in adults where either non-union exists or strong union. This would appear to be the case from the comparative results in the following three cases: —

Case 6.—"S." A rapidly growing boy of thirteen was operated upon for bad deformity at the hip, following severe hip disease. The usual correction followed with no apparent relapse for a year following the operation. The boy then grew rapidly, and a recurrence of the deformity took place, so that at the age of eighteen there was a shortening of four inches, partly due to the abduction and partly due to the greater growth of the other limb. The patient died six years later of phthisis. At the time of death the limbs were parallel, and there was but little flexion and no abduction, but the position of forced abduction and gain in length of the limb had been lost.

Cases 7 and 8.—"A" and "B." Boys of twelve and thirteen years of age respectively, both rapidly growing, and the operation being the same as in Case 7. Loss of forced abduc-

tion in both instances, the limb remaining in a position parallel to the long axis of the body, but with a loss of the position of forced abduction.

If these conclusions are correct, it would appear that it is necessary for children to wear retentive apparatus or to be kept in a recumbent position relatively longer than would usually be the case after fracture. It is necessary that retentive apparatus in children should be worn longer than in adults, partly also from the active nature of children, who, as soon as discomfort is relieved and any pain on motion ceases, are apt to throw weight on the limb without careful consideration of the way in which the weight falls. Furthermore, as the weight of children is less than that in adults, the child attempts to use the limb more quickly than could be done in adults, and for this reason less care is exercised in guarding the limb in the corrected position. It would appear that not only should no child be allowed to walk upon the limb until eight weeks has elapsed after the operation, and a subsequent period of eight weeks should be insisted on for semi-recumbent treatment, in order to prevent the possibility of relapse of the deformity; and in rapidly growing children a longer time is needed.

Another factor to be considered is the tendency in growing bone to reproduce by growth the position of the deformity. This would be apparently the case in all rapidly growing children that have come under my care, and it is for this reason that the operation does not seem to adapt itself to that of the very rapidly growing period. Where the operation is undertaken in younger children, a long after treatment should be insisted on. This is also true, to a degree, in early adolescents; but, as the growth of the bone is nearly accomplished, the factor to be considered is the care of after-treatment until the bone is united rather than the subsequent growth of the bone.

In brief, it may be said that the operation of subtrochanteric osteotomy for the correction of the deformity following

hip disease is one which can be done in adults without fear of non-union, or even in middle life, and that the danger of relapse is greater when the operation is done in childhood or in rapidly growing years. The danger of non-union is apparently not an imminent one when the operation is done in adults, but the period of convalescence and disability after the operation is comparatively long when the operation is undertaken in middle life. For this reason it would seem to be better surgery to defer the operation, when possible, in young childhood until the period of rapid growth has been passed.

IV.

THE MECHANICAL *v.* THE OPERATIVE TREATMENT OF RACHITIC DEFORMITIES OF THE LOWER EXTREMITIES, PRESENTING A NEW OSTEOCLAST.

R. TUNSTALL TAYLOR, M.D., BALTIMORE.

What I have to say is very brief in this connection, and is in behalf of the immediate correction of rachitic deformities of the lower extremities by either manual or mechanical straightening in the stage of softening, or osteoclasis or osteotomy in the stage of eburnation.

In 109 consecutive cases at the Hospital for Crippled and Deformed Children, the following deformities (genu valgum 42, genu varum 59, and anterior bowing of the tibia 8) we have operated with only two relapses and one over-correction (a genu valgum complicating a genu varum, requiring a secondary operation to obtain a satisfactory result).

We have not discriminated, as is usually done, and put braces on the very young with flexible bones, but simply under ether straightened these legs manually or instrumentally, used fixation in plaster in slight over-correction for four to six weeks, and instituted proper feeding, good hygiene, and fixation on a Bradford frame, until all symptoms of the so-called "acute rickets" are passed, as shown by absence of the usual manifestations and presence of improved nutrition.

In only two cases, so far as I can find in our records, have braces been employed, and these were not satisfactory in the results obtained.

My reasons for holding these views are:—

First. When we take into consideration the primary cost of braces to this class of cases, which we find among the negroes,

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

Italians, and poorer classes of Americans in our dispensaries, we must needs feel that any immediate correction of the deformity which will obviate the expense of braces is desirable.

Second. The objection raised by one of my New York friends, that they "could not habitually operate on bow-legs and knock-knees there, because the parents would not consent, and 'had seen other children with suitable braces for the deformity,'" we meet, *not* by suggesting "*an operation* to break the legs," but by "a suggestion that we give the child a little gas and bend the legs straight," which we do often then and there. Seldom are we refused, especially when we tell them that the child's legs will have to be held straight in plaster of Paris for four to six weeks, and will require nothing to keep the deformity from returning.

Third. The danger of these operations needs not deter us in the slightest degree with modern asepsis (I speak of osteotomy) from resorting to the operative method. Osteoclasis for genu varum is one of our simplest and most harmless procedures, even standing ahead of tenotomy of the tendo Achillis in its simplicity.

We have not infrequently sent home the same day that the operation was done in the dispensary, not only the cases of genu varum after osteoclasis, but genu valgum also.

With plenty of padding under the cast, especially at the seat of the fracture and between the toes, these patients have little or no discomfort except from the restraint offered by the plaster, and are cured by the time the braces, had they been ordered, would have come from the instrument-maker and been properly adjusted to be worn in the daytime.

I say "daytime," for, with the usual forms of braces for the rachitic deformities of the lower extremities, we have the shoes as the lower attachment, and hence we have them taken off for ten hours at night and for two hours at mid-day for the nap then. Twelve hours with and twelve hours without braces in the twenty-four!

Fourth. The comparison of the length of time the child has to submit to the discomfort of the plaster bandages *versus* the braces is wholly in favor of the operative method.

In conclusion, I wish to present to the Association a new osteoclast, which I have devised on the lever principle instead of the screw, as seen in Rizzoli's, Grattan's, Colin's, and Lorenz's osteoclasts.

It consists of a T-shaped base, the arms of the T being some twelve inches wide and the stem some thirty-six inches long. Arising from the intersection of the arms and on the stem is an arc some twelve inches high at its summit and twelve inches wide at its base.

Some three inches above and parallel with the stem of the base is a movable half-inch square rod which may slide backward and forward through slots in the arc.

From the summit of the arc depends the short arm of the lever some nine inches down to its attachment to the movable rod. The long arm of the lever extends backward at a right angle to the short arm some twenty-four inches. It is fastened at the top of the arch by a bolt allowing free play.

Its attachment to the movable rod is by means of a notch to receive the rod, an inch by one-fourth of an inch slot on the sides, through which may pass and play a pin into one of a series of holes which can be used to regulate the length of the movable rod beyond the top of the T where it has attached, by a swivel joint, a pressure plate.

Two C-shaped arcs of the usual type are attached and regulated by set screws on the arms of the T for children for different length legs.

For adjustment to legs of varying circumferences the pin through the slot can be adjusted, so that, when the lever is pressed down after the leg has been placed against the C-pieces, the forward thrust of the movable rod may be extreme. For genu valgum both C-pieces may be put on one side.

The advantages claimed for this device are the rapidity of the fracture and release, which cannot be obtained with the other osteoclasts. It can be taken apart readily for carrying.

V.

THE SURGICAL PATHOLOGY OF GENU VARUM AND GENU VALGUM.

WALLACE BLANCHARD, M.D., CHICAGO.

All surgical proceedings should be governed and bounded by the indications and limitations of existing pathological knowledge. I do not know that I can add anything to the present accepted pathology of genu varum and genu valgum, but I may be able to demonstrate that there is occasionally a wide divergence between the well-known pathological indications, on the one hand, and the surgical procedures, on the other. Although genu varum and genu valgum are usually rachitic deformities, yet it is well understood that a very considerable proportion of these deformities of the legs occur in children in whom no symptoms of rickets are observed.

Eburnation may be premature or dilatory without any actual disease, just as dentition or adolescence may be early or late without pathological significance. The healthy, well-nourished child may walk early and have bones that harden slowly, and a deformity of the legs that is only apparently rachitic may develop.

The skiagraphic observation of a large number of cases of genu varum and genu valgum would seem to prove quite conclusively that these deformities very largely follow fixed laws of development.

Different healthy individuals show the normal curves in the long bones to a more or less pronounced degree, and it has been observed that the greater variational tendency lies in the natural curves to exaggerate and become deformities.

Advanced genu varum generally shows three contributing curves, the primary deviation being usually an exaggeration

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11–14, 1903.

of the normal out-bend in the lower third of the femur. This is the typical first stage.

As the deformity progresses and leverage on the long bones increases, succeeding out-bends follow, usually in this order: first, in the upper third of the tibia, and this bend usually becomes the most pronounced; second, in the lower third of the tibia, with a succeeding slight out-curve between these last two pronounced bends.

The changed direction of the axis of the lower end of the femur, of course, changes the direction and tilts the normal level plane of the condyle. I have described a typical case of bow-leg in which the central deformity point—that is, the apex of the deformity—is in the upper tibial shaft. The only logical point of correction, either by osteotomy or osteoclasis, is at the apex of the deformity. There the least correction is necessary to obtain a perfect result, and the leg can be lengthened to the best advantage.

An occasional exception to the usual rule is when the only marked deformity bend is an exaggeration of the normal out-curve of the lower femoral shaft. In a bow-leg of this character the outer condyle appears to be lengthened and enlarged.

In a considerable number of skiagraphs I failed to find a case in which the condyles deviated from normal except in conformity to the altered direction of the lower femoral shafts.

Another exception to the usual rule of development is where the most pronounced deviation from normal occurs in an outward bend in the lower third of the tibia. In cases of this character a correction at any point far removed from the culminating point of the deformity cannot give any compensatory corrective results.

Fig. 1 is a skiagram of bow-legs, and is selected as illustrating several conditions. The child is eight years of age. The original bone deformity was undoubtedly an increase in the normal out-curves of the femurs, and the secondary tibial out-bends subsequently became the most pronounced. Four years of brace treatment have done but little more than to slightly correct the deformity by opening up the inner knee

articulations so that the deformity is nearly doubled when standing. Of course, these bones are now too firm to be affected even slightly by braces, which serve only to enrich the instrument-makers and satisfy the parents that something is being done.

The skiagraphic study of genu valgum in various stages

FIG. 1. FIG. 2.

FIG. 1. Skiagram of a typical case of genu varum, with the central deformity in the upper third of the tibia.

LETTER A indicates the only logical point for over-correction.

FIG. 2. Skiagram of a typical case of genu valgum, with the central deformity in the upper third of the tibia.

LETTER A indicates the only logical point for correction.

clearly demonstrates that, like genu varum, a large majority of the cases follow well-defined lines of development, the initial deformity being usually an inward bend of the tibia, from three to six centimetres, below the head. As the deformity progresses, a distributed inward curve develops throughout the remainder of the tibial shaft, accompanied by outward rotation. The upper portion of the fibula retains its

normal shape, but develops a sharp inward curve in its lower third. The normal space between the tibia and the fibula in their lower thirds becomes obliterated.

With this condition of deformity existing for a considerable period, with the body weight transferred to the outer condyles, with the external hamstring tendon shortened, and the internal hamstring overstretched and relaxed, we have a typical case as it is usually presented for correction.

Skiagraphic observation failed to show any marked deviation from normal in the condyles.

The only advantageous point for correction is at the apex of the inward convexity and primary seat of the deformity in the upper portion of the tibia, where the least operative correction is required for the successful obliteration of the deformity and lengthening of the leg.

Fig. 2 is a skiagram of a typical case of genu valgum.

Perhaps Professor Lorenz has been chiefly responsible for keeping alive the scientific superstition of shortened and elongated condyles by his operation for genu valgum of overstretching the external hamstring tendon and putting the leg in plaster for a month, and in braces for a year thereafter, on the theory that the internal condyle would diminish with increased pressure, or that the external condyle, when relieved of pressure, would elongate, and so correct the deformity. This is a theory in direct violation of the now almost universally accepted law of Wolff. Lorenz[1] says that he has recently abandoned this operation, and gives as his reason that "a loose joint is to be feared, and, besides, it takes too much time." As a substitute, he advances central epiphysiolysis as an ideal operation, and commends it to the exclusion of all others.

The apparatus for accomplishing epiphysiolysis is quite fully described and illustrated in a paper recently published by Dr. Max Reiner,[2] assistant at Lorenz's Universität Ambulatorium for Orthopedic Surgery at Vienna. The apparatus used is screwed like a vise to the operating table, and holds the lower thigh firmly while the leg is worked like a lever. The operator stands with the leg on his right, with the forefinger

of his left hand in a groove in the apparatus directly under the epiphysis, with both hands grasping the knee, with the fore-arm resting low down on the outside of the patient's ankle. In this position the operator may throw his entire weight on the distal end of the lever, giving him tremendous power.

FIG. 3.

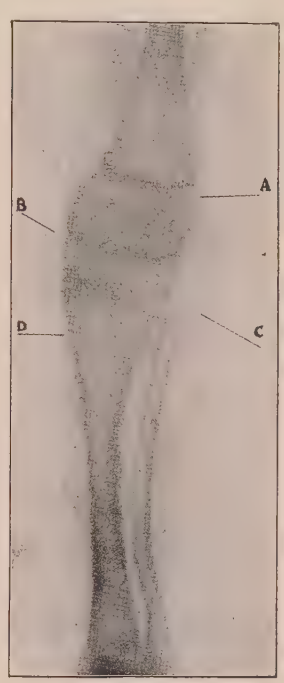

FIG. 4.

FIG. 3. A reproduction of Fig. 6 in Dr. Max Reiner's paper on epiphysiolysis. Letter A indicates the opening of the outer half of the joint.

FIG. 4. A reproduction of Fig. 10 after Reiner. Letter A indicates a separation of the epiphysis from the diaphysis, Letters B and C the tilted angle of the head of the tibia, and Letter D the uncorrected central deformity in the tibia.

The operator is directed to alternately increase and relax the downward pressure until the deformity is corrected.

With a view of ascertaining the feasibility of producing epiphysiolysis, I have had constructed the fixation apparatus from descriptions and illustrations given by Reiner. The apparatus accomplishes all that is required of it; that is, a perfect fixation. I am convinced that one may occasionally

get a separation of the epiphysis, but that the soft parts will give way under the stress in a majority of cases before epiphysiolysis is accomplished. Of course, a fracture through the epiphysis can only be obtained by the leverage power transmitted through the external hamstring tendon and ligaments. Which is more likely to occur, a fracture through the epiphysis or a separation of the external articulation?

Reiner answers the question by claiming that he is almost invariably successful in disjoining and shifting the epiphysis, and gives a number of illustrations from skiagrams to prove his point. I here present copies of the two most distinct of his skiagraphic illustrations. The first, Fig. 3, forty-four days after operation, clearly shows that the outer half of the joint has been widely separated, sufficiently so, indeed, to neutralize a pronounced knock-knee without epiphysiolysis, the epiphysis having apparently remained undisturbed, though Reiner thinks otherwise.

The second illustration, Fig. 4, fifty-eight days after operation, shows that epiphysiolysis has been accomplished, and that the normal relation of epiphysis and diaphysis has been shifted. It also shows that the outer half of the articulation has been separated, necessitating the over-stretching or rupturing of the external hamstring tendon. This same illustration also shows very nicely the central deformity in the upper tibial shaft.

In opening the outer half of the joint and separating the epiphysis, the straightening of the leg has been accomplished after a fashion, but in bringing the bent tibia to a perpendicular the uncorrected upper deformity curve in the tibial shaft has tipped the tibial head to an angle of 45°. It is possible that a year or two in plaster of Paris, dressings, and iron braces may assist nature in welding this aggregation of malpositions into a leg that may possibly be symmetrical and serviceable, but it is rather more than doubtful.

Reiner says that, when attempting epiphysiolysis, he occasionally gets an infraction above the epiphysis. I have frequently used the Grattan osteoclast with one resistance bar

placed against the condyle below the epiphysis and the second resistance bar about six centimetres above, and have invariably found that I obtained an osteoclasis in the shaft as remote from the epiphysis as the upper resistance bar would allow.

In my experience the lower end of the femoral shaft remains friable, and will bend without fracture six or eight years after eburnation has become so complete that the tibia will fracture with a loud snap.

Reiner places the limits of age for epiphysiolysis at from seven years to seventeen and a half while Lorenz places it at from five to sixteen years.

Reiner practically admits the frequent inefficacy of the operation when, in closing his paper, he says, "There is danger of the return of the deformity after the removal of the plaster bandage, in which case apply retention apparatus for a prolonged period."

Since the central point of the deformity is usually in the upper third of the tibial shaft, central epiphysiolysis, even if accomplished, is a misnomer. The term "eccentric epiphysiolysis" would be more appropriate to the operation, which, at best, is only the production of a deformity in one bone to offset the deformity in another.

Epiphysiolysis, like the bloodless reduction of congenital hip dislocation, is of Italian origin. Dr. Codivilla, of Bologna, reported on a large number operated upon in this matter before the adoption of the method in Vienna.

An occasional exception to the general rule of development of genu valgum is seen in the partial or entire obliteration of the normal out-curve of the lower third of the femur, and the out-curve may become absolutely reversed. This changed direction of the lower end of the femur produces a misleading appearance of elongated inner condyles. The normal level of the condyles and articulations have been tilted several degrees. Even in these cases the deformity is not central in the condyles or articulations, but at the abnormal bends in the femoral shafts above. In these cases the only logical

point of correction is at the centre of deformity. After the correction has been made and the normal direction of the femur has been restored, it will be found that the condyles are normal.

In these cases, if in any, epiphysiolysis would be permissible, though I believe the operation to be most unfortunate when most successful; and it remains to be proven that the separation of the epiphysis does not endanger bone development. After two trials, in which I have faithfully followed Reiner's method, I have only succeeded in over stretching the external hamstring and opening up the outer half of the joint. The operations were followed by considerable swelling and severe pain, and I do not feel justified in continuing the use of so dubious a procedure.

Another rare exception to the rule in genu valgum is where the chief deformity is an inward bend in the lower half of the tibia. Here, also, the only logical point of correction is at the apex of the deformity.

Osteotomy is undoubtedly the most popular operation for the correction of severe rachitic deformities of the legs, yet it has many disadvantages when compared with osteoclasis performed with the aid of the perfected Grattan osteoclast. Some of the disadvantages are: time required for operation; the danger of infection, which, though it may be slight, nevertheless exists; time, care, and expense necessary for antiseptic precautions; and the pain that always accompanies an open wound. But the most serious objection to osteotomy is the delayed union as compared with union after osteoclasis. This is undoubtedly due to the severing of the continuity of the bone shaft and the carrying of soft tissue into the open space with the chisel. This delayed union has frequently to be supplemented by post-operative treatment, which is never required after rapid osteoclasis.

Rapid osteoclasis, as practised at the Home for Destitute Crippled Children in Chicago, may be briefly described as follows: Ether is administered so rapidly that in two minutes the patient is ready for operation. The bending or breaking

FIG. 5. FIG. 6. FIG. 7.

FIG. 5. A typical case of genu varum.

FIG. 6. Skiagram showing over-correction of the tibia at the apex of the deformity.

FIG. 7. The same case six weeks after the operation, showing that the over-correction has assimilated into the general contour, producing symmetrical legs.

of the bone in the osteoclast rarely takes more than six or eight seconds. The deformity is over-corrected by hand and held while a plaster bandage is applied. Seldom more than five minutes is consumed in the application and setting of the plaster bandage, and eight minutes suffice for the anæsthetic and operation, and the patient is removed from the table. The brevity of the anæsthesia necessitates the administration of but a small quantity of ether, permitting the patient to escape nausea and vomiting; and the rapidity of the operation is necessary to preserve the soft parts from bruising.

In bow-leg, with three contributing curves, the apex of the most prominent is usually selected for the operative point, and over-correction is made not only sufficient to correct the curve attacked, but continued sufficiently to neutralize the two minor deformity curves.

Fig. 5 represents a severe case of bow-leg. The only operation was an over-correction of the tibia just above the middle, in the apex of the deformity. The skiagram of this case, Fig. 6, shows that the two minor curves and the over-correction curve, though pronounced, have neutralized each other. The over-correction has lengthened the legs about six centimetres, and, as will be seen in Fig. 7, has assimilated into the general contour of the legs, producing a perfectly symmetrical appearance.

To illustrate knock-knee correction to the best advantage, I have selected a bilateral case, as will be seen in Fig. 8, the only deformity being in the left tibia, about three centimetres below the head. In this case the only operation was an osteoclasis at the apex of the deformity in the tibia, with slight over-correction. The result will be seen to be perfect, both in the skiagram, Fig. 9, and the photograph taken six weeks after the operation, Fig. 10. By comparison of the two legs in the skiagram, it will be seen that there is practically no difference in thecondyles.

Rapid unions are the invariable rule following osteoclasis, and in six weeks after the operation the patient is walking on straight legs, without braces of any kind. A record of

FIG. 8. FIG. 9. FIG. 10.

FIG. 8. A case of bilateral genu valgum, with the central deformity just below the head of the left tibia.

FIG. 9. Skiagram, with right and left reversed, after correction at the apex of the deformity in the tibia at letter A, showing the condyles of both legs to be practically normal.

FIG. 10. The same case six weeks after correction.

five hundred cases without a single abrasion, delayed union, or other unsatisfactory result, would seem to prove that rapid osteoclasis is a safe and certain operation for the correction of genu varum and genu valgum, and that it is free from complications.

In conclusion, skiagraphic observation seems to prove that the deformity of knock-knee and bow-leg is seldom, if ever, central in either the condyles or the joint.

I feel constrained to say that epiphysiolysis is hardly worthy of serious consideration, when compared with either osteotomy or osteoclasis, that osteotomy has some slight dangers from which osteoclasis is free, and the comparatively prolonged time taken for bone union and recovery should condemn it when osteoclasis is available.

Bibliography.

1. Lorenz. Medical Record, New York, December 27, 1902.
2. Reiner. Zeitschrift für orthopädische Chirurgie, XI. Band.

DISCUSSION.

Dr. Augustus Thorndike, of Boston, said he had been very much impressed with this device of Dr. Taylor's, for it seemed to more nearly imitate the production of a fracture by natural processes than any other osteoclast hitherto invented because of the rapidity with which it worked. The mechanism was worthy of great commendation.

Dr. John Ridlon, of Chicago, said that this apparatus of Dr. Taylor was a beautiful apparatus. He had used his own instrument, modelled after this plan, and had torn the flesh of the limbs in two instances, and he no longer employed it. He would criticise the apparatus presented by his own experience. The leg pieces in that apparatus were covered with thick rubber tubing such as was found under elliptical springs in heavy wagons, and he was sure that the padding in this apparatus presented, as in his own apparatus, would cause the skin to catch and not slip on the hooks, and this, he was sure, was the cause of the tearing of the skin. The hooks should be of polished metal, and round, as in the Grattan osteoclast. In several hundred operations done by Dr. Blanchard and himself under such conditions the skin had not torn. He also believed that the round or elliptical bearing pad would break the bone more easily and certainly at the desired point

than the flat breaking pad. The apparatus presented was certainly ingenious and much less expensive than the Grattan osteoclast.

Dr. Henry Ling Taylor, of New York, said he had been very much impressed with both papers. The first paper was an exceedingly valuable contribution to the subject. The idea of breaking the bones below the knee for knock-knee was new to him, and he was not aware that this had been done except in special cases: hence this point was certainly one of great importance. If the cases all resulted as well as those cited, it would seem that a great advance had been made. The osteoclast which he used was the Grattan instrument modified by Drs. Phelps and Weigel, and with it he had found it rather difficult to produce the fracture in close proximity to the joint. In little children the fracture usually occurred not far from the centre of the tibia: fortunately, this point of fracture seemed to afford sufficient compensation in most cases. Another point of some importance in the correction of bow-legs was the inversion of the foot occurring in nearly all these cases. Apparently, it was due to a rotation or twist in the shaft of the tibia, which was usually overlooked in operating. The tibia was ordinarily straightened and put up with the curve straightened, but with this twist unstraightened. Such cases recovered with the bow-legs cured, but with the feet turning quite markedly. In operating, one should take pains to manipulate the fragments until quite free, and then give the lower fragment a strong outward twist. He had adopted this plan in the past year or two, and with better results. There was another reason for doing this; *i.e.*, that with the outturning foot the strain was in the proper direction to prevent recurrence of the deformity. The osteoclast shown seemed to him an exceedingly workmanlike instrument, but he agreed with the criticism that the hooks would probably work better without padding. If it did better work than the improved Grattan osteoclast, it would be a remarkably fine instrument.

Dr. W. R. Townsend said he had had the pleasure of seeing this new instrument work, and it certainly did the work quickly, accurately, and efficiently. The suggestion made by Dr. Ridlon was a good one, for he had noted a slight catching of the skin. This instrument, when perfected, might take the place of the heavy and more expensive instrument of Grattan, with which there was always some difficulty in releasing the screw with sufficient rapidity.

Dr. H. A. Wilson said he would like to ask if Dr. Blanchard had used the osteoclast in bending the bones in their entirety in addition to the production of the fracture in the extremities; in other words, whether both processes had been used in the same patient. In the first skiagram with the long curve he thought a good deal could be

gained by bending the entire bone first, and then producing a fracture. With reference to the various forms of appliances for the production of fractures without cutting, he had a distinct recollection of having seen the skilful production of fractures by hand manipulation alone by Dr. Townsend, which had demonstrated to him the advantage of a very rapidly working instrument. The Grattan osteoclast seemed to him hardly rapid enough in its action. It looked as if this new instrument of Dr. Blanchard would be an improvement in this particular.

Dr. BLANCHARD said, in reply to Dr. Wilson, that in the work done in Chicago by Dr. Ridlon, this had been done in the Home for Crippled Children. Many cases that seemed to be impossible of treatment by hand had been very successfully treated by Dr. Ridlon by hand manipulation. It could be done by one with sufficient muscular power. Frequently in cases on which they started to do osteoclasis it was found that the bones would bend quite easily, and that this bend could be distributed throughout the entire shaft of the bone. The limb could then be put up in plaster of Paris with perfect result. Frequently, however, in cases of knock-knee the fracture of the Grattan osteoclast occurred exactly at the desired point. If one resistance bar were nearly opposite the pressure bar, and the other considerably removed therefrom, the instrument would work very accurately. It seemed to him that one objection to the new Taylor osteoclast was that the leg supports would tend to spring outward and so favor the laceration of the soft parts. The conception of the instrument was excellent; but he would suggest replacing these spring resistance bars by very heavy bars, also the removal of all padding.

Dr. R. TUNSTALL TAYLOR thought all the members must feel very grateful to Dr. Blanchard for his study in this field. The idea of having the leather padding sliding on the resistance bars was that, if the leather adhered to the skin, the two would move together on the bars and so obviate any tearing of the skin, but the instrument was practically as safe without it. The apparatus could all be taken apart and packed flat in a dress-suit case. For knock-knee two resistance bars could be placed on one side.

VI.

THE OCCURRENCE OF PAINFUL AFFECTIONS OF THE FEET AMONG TRAINED NURSES.

A Series of 500 Observations upon Normal and Disabled Feet.

ROBERT W. LOVETT, M.D., OF BOSTON.

The liability of trained nurses to develop some static trouble with their feet during their hospital service is well known. In large hospitals it becomes a matter of economy to limit this so far as possible, and the following investigation was undertaken by me in a large general hospital in the hope of diminishing the trouble by seeing that all nurses wore during their course of training a proper boot, and were placed, so far as possible, under conditions favorable for their feet. With this in view, every nurse entering the hospital was examined soon after entrance, boots of a suitable shape were prescribed, and, if trouble with the feet arose during the course, she was seen and prescribed for.

The number of nurses observed having reached 500 in the course of some eight years, it has seemed worth while to analyze the records of these observations. In addition to any information to be derived about the etiology of this acute form of static trouble of the foot, there are certain questions of specific interest to hospital superintendents, police commissioners, and civil service examiners, which might well be elucidated by this mass of material. These questions are in part as follows:—

1. Can it be told by examination whether the feet of an individual are likely to break down or not under the strain of constant use?

2. What are the factors in causing this breaking down?

3. What is the nature of the process giving rise to the painful condition?

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

4. How much may be done toward preventing it by the use of proper boots?

The material at my command consisted entirely of young women between the ages of twenty-three and thirty-five. They were presumably healthy, having been selected from a large number of applicants who had answered a number of questions with regard to their general health when they filed their applications for admission to the school. The majority of them had previously earned their own living, having been school-teachers, housekeepers, nurses or attendants in other institutions, stenographers, and the like. Many had, however, lived at home, with no occupation.

During one period of a few months the nurses were not examined at entrance, but were fitted to regulation boots in a routine way, and only seen by me if they had trouble. But under these circumstances the percentage of trouble was higher than when they were examined at entrance and prescribed for individually, and that method was abandoned. With the exception of this time, during which no records were kept, and of another period of a few months when the work was undertaken by a substitute, the 500 nurses have all been seen by me and prescribed for individually, and the series of observations is continuous.

The conditions of their life in the hospital are of importance. The probationary period is two months, the course itself two years. The nurses on the average work nine and a quarter hours, with two hours off during the day. They do not live in the hospital building, but in a modern, well-ventilated dormitory near the hospital. There are now about 150 nurses in the school, but when the inquiry was begun the school contained only about 115. There have, therefore, been under my observation for eight years, at all times, from 115 to 150 young women living under conditions entailing great strain on the feet. Having records of all these cases along with careful notes of the nurse's condition at entrance, I have been in a position to estimate the value of certain things observed in the feet at entrance, and also the chance of familiarizing

FIG. 1. Pronated foot without breaking down of the arch. See tracing.

FIG. 2. Patient standing on glass table with a mirror underneath. On the mirror is seen the weight-bearing surface of the foot.

myself with the ordinary type of trouble as it occurs in these nurses, of studying its character and progress, and of attempting to shorten its course.

Method of Examination.—Imprint tracings were first used by having the nurse step on smoked paper, but after 130 of these observations it became evident that they were practically worthless. An imprint of this sort is a composite record of two positions. The foot first touches the paper and records the non-weight-bearing imprint, and then the imprint of the weighted foot. The two are merged, and a foot, which in use really rests upon two points of pressure only, the ball of the foot and the heel, gives a mark as if the outer border touched also. This outer border touches at first, then lifts under weight (Fig. 1). The imprints not only gave no reliable information as to the durability of an individual foot, but, when studied, showed in most cases that they were made up of two superimposed impressions, and must be misleading. The method was therefore abandoned.

A plate of glass with a mirror placed at an angle underneath was from that time used in all examinations. The nurse was examined with her feet bare, facing the observer, on a glass plate raised 18 inches from the floor (Fig. 2). In her natural standing position the anemic weight-bearing surface of the feet was observed through the glass, being reflected in the mirror. The pressure surface was recorded by a pencil sketch in the record. These contact surfaces followed the same three types shown in the figures of the smoked tracings (Figs. 3, 4, and 5). By inspection of the feet from in front the degree of rolling in (pronation) of the foot was next noted and recorded as the nurse stood in a natural position. The condition of the circulation of the feet was noted in many cases, whether congested with distended veins or not. Calluses, bunions, crumpled toes, ingrowing nails, and other signs of abuse were noted. Finally, the general appearance of the foot and an estimate of its probable usefulness was recorded as excellent, good, fair, suspicious, or poor. Each nurse was then given a note to a retail shoe store with suggestions as

FIG. 3. Tracing of a flat foot. No symptoms, foot useful.

FIG. 4. Tracing of a foot resting on two islands. No symptoms, foot useful.

to any modification required in fitting her to the regulation boot.

Value of the Examination in determining the Durability of the Feet of an Individual.—In forming the opinion expressed in the terms "excellent," "good," "fair," etc., I was guided by the general appearance of the foot, chiefly whether or not

FIG. 5. Type of tracing described as normal, with outer border touching ground.

it was pronated much, the condition of the circulation, the degree of flexibility to dorsal flexion in passive manipulation, and the nurse's previous history.

In analyzing the records, I took the consecutive histories of a certain number of nurses who had during their course trouble of enough importance to lead them to complain, and of a similar number of nurses who had no trouble, and compared the later histories of the nurses of the two groups. The figures are given in percentages:—

	Nurses having trouble.		Nurses having no trouble.	
Excellent	12%		.6%	
Good	28%	60%	26%	62%
Fair	20%		30%	
Questionable	12%		12%	
Poor	10%	40%	10%	38%
Not classed	18%		16%	

It will be seen that my opinion of the usefulness of the foot formed in this way was of no practical value in selecting the cases likely to give trouble. To reject applicants on an opinion formed by inspection would be unsafe. There have been five or six nurses with perfectly flat feet to go through the school without any trouble. There have been many nurses with the most unstable and threatening feet, which were badly pronated and bore heavily on the inner side of the ball of the foot and on the heel, who have gone through the school without discomfort, whereas nurses with feet in perfect relation to the leg according to all accepted ideas have been speedily incapacitated.

Weight and Size of Boot.—A series of 60 observations were made as to the relative weight of the nurse and the size of boot worn, to see if the relatively small feet were the troublesome ones. The nurse was asked in each case what her weight was, and what was the size of her boot. Of the nurses having trouble, the average weight was 132 pounds and the average boot No. 5. Of the nurses having no trouble, the average weight was 131 pounds and the average boot No. 5. It was evident that no information was to be obtained from this line of inquiry.

Pronation.—The amount of pronation or rolling in of the foot was investigated (Fig. 6). It is generally assumed that, although a certain amount of pronation is normal in weight-bearing, more than a moderate amount is an evidence of weakness in the foot and predisposes to breaking down. The figures

to be quoted do not bear out the opinion that decidedly pronated feet are necessarily likely to break down under strain.

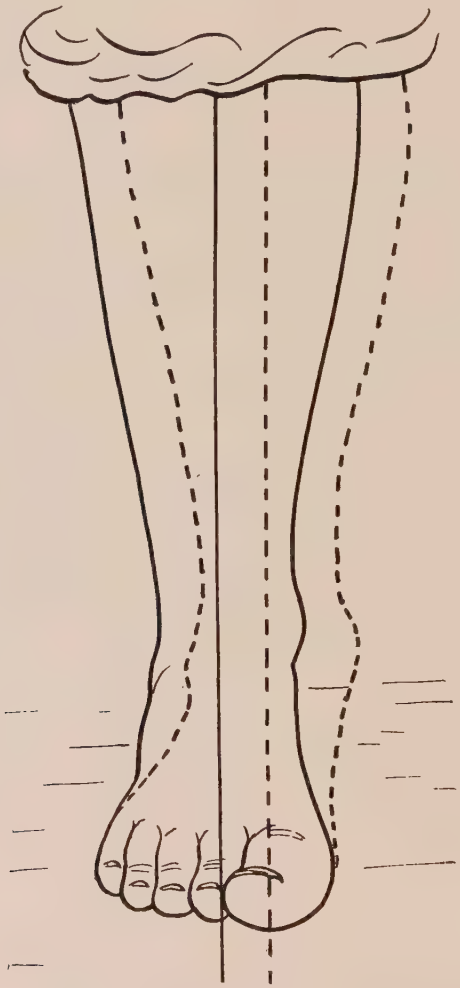

FIG. 6. Normal and pronated position of the foot, the latter in dotted outline.

This fact explains in a measure the foregoing statement that the estimate formed by inspection was of little value; for, influenced by general opinion, I was led to regard pronation as the most important factor in forming my opinion. The

estimate of pronation was made by the eye, and was recorded when the nurse was first seen.

The table consists of the consecutive records of 185 nurses analyzed later to see what proportion of nurses who had trouble and who had no trouble had pronated feet when they entered.

In a general way the percentage of trouble was slightly higher when much pronation was present (23 per cent. as contrasted with 17 per cent.), and slightly lower when there was little or no tendency to pronation (40 per cent. as contrasted to 43 per cent.). But such a slight difference shows that the

	Nurses without trouble.		Nurses with trouble.	
Pronation marked	13%	17%	18%	23%
Pronation more than average	4%		5%	
Pronation average or moderate	30%		26%	
Pronation slight	17%	43%	20%	40%
Pronation very slight	10%		10%	
No pronation	16%		10%	
Not noted	6%		7.5%	
Feet flat	1.2%		. . . .	

degree of pronation or "weak foot" is of little practical value in forming an estimate of the usefulness of an individual foot.

Pressure Areas on Glass.—The only sign observed at the first examination that seemed to be of prognostic value was the imprint of the nurses' weight-bearing foot as observed through the glass plate. The nurses showed three types of pressure areas: (*a*) when the foot rested on two islands, one under the heel and one under the ball of the toe, while the outer border did not bear weight (this type was classed as "two islands"); (*b*) when the outer border bore weight as well as the heel and front of the foot; (*c*) when the foot was more or less flattened and the outer border was very broad.

150 nurses were classed as follows:—

	Both feet "two islands."	One foot "two islands." One foot outer border bearing weight.	Both feet outer border bearing weight.	Both feet flat.
Nurses having trouble . . .	58%	18%	18%	6%
Nurses having no trouble .	42%	15%	38%	2%

It will be seen that nurses whose feet bear weight along the outer border are less likely to have trouble than when the weight rests on two pressure islands.

Flexibility of the Foot, Circulation, etc.—The degree of flexibility of the foot in passive dorsal flexion proved not to be a sign of prognostic value, nor did disturbance of circulation in the foot, as shown by congestion and distention of the veins at the first examination, signify anything of importance, as at the beginning of the training such a disturbance was common.

BOSTON MED. LIB. JUL 26 1904

The index of pronation of the foot, as measured by an instrument devised by Dr. F. J. Cotton and myself, did not prove of the value that we had hoped* (Fig. 7).

In 21 cases measured by this instrument the index averaged as follows:—

Nurses without trouble	Right foot supinated.	60 L.	P. 61.
	Right foot pronated.	63 L.	P. 65.
Nurses with trouble	Right foot supinated.	58 L.	P. 61.
	Right foot pronated.	62 L.	P. 65.

Much to my regret, therefore, I am obliged to record the fact that the original examination has proved of little value, so far as it indicates whether the feet of an individual nurse are likely or not to give trouble under the severe strain of use. The only point to which much importance can be attached is the character of the imprint on glass. The examination, however, is, I believe, of great value in suggesting precautions which may be taken which will be spoken of later.

*Lovett and Cotton, "Some Practical Points in Anatomy of the Foot," Boston *Medical and Surgical Journal*, August 4, 1898.

Nature of Process.—The character of the disturbance when it occurred was next investigated.

Symptoms were of a pretty uniform character. Burning and a full feeling in the feet were succeeded by lameness and stiffness. Swelling of the feet and some restriction of the normal motion followed in the severer cases. These symptoms in favorable cases under proper treatment improved and dis-

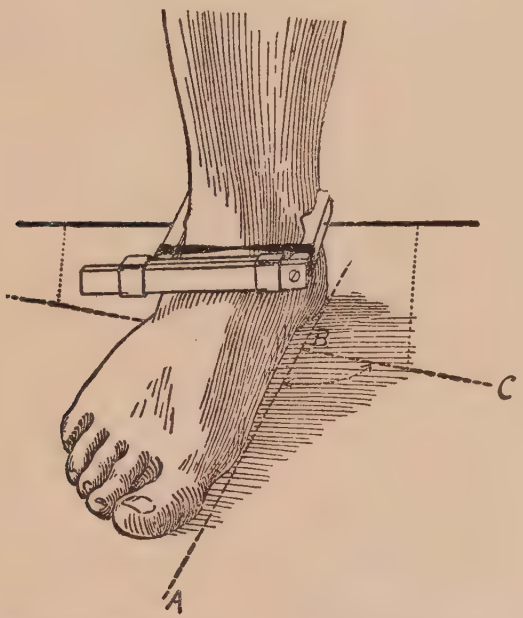

FIG. 7. Apparatus for estimating index of pronation. The angle to be measured is A, B, C.

appeared. In certain cases, however, in spite of proper support, massage, douches, etc., these increased until the nurse was incapacitated from work for a few days. Tenderness appeared in nearly all these cases, either under the scaphoid or under the bottom of the heel, rarely in the great-toe joint. Pain in the knees and back were not uncommon symptoms. Rare symptoms were synovitis of the tendo Achillis, and only in one or two cases was there complaint of pain in the front of the foot, and these seemed to be traumatic.

Change in Imprint.—The essential character of the static change causing the trouble was investigated and proved to be a moving inward of the bearing surfaces as seen through the glass, in a few cases observed no change had occurred, and the imprint was the same as at entrance. It seemed generally as if the muscles relaxed and allowed the foot to roll in. *Real breaking down of the arch of the foot in nurses having trouble was not observed in any case.*

Season of Year.—It became evident that nurses were more liable to have trouble at certain seasons than at others. The cases classified by months are as follows:—

January	8% of all cases.		July	4% of all cases.	
February	14% " "	64%	August	2% " "	
March	24% " "		September	0% " "	
April	10% " "		October	0% " "	
May	16% " "		November	8% " "	
June	6% " "		December	6% " "	

64% of all cases occurring in February, March, April, and May.

Time at which Trouble occurs.—Inquiry as to the period of the nurses' training at which trouble began gave the following result:—

At once	2%	Four months	6%
One month	16%	Six months	6%
Six weeks	4%	Nine months	2%
Two months	20%	Twelve months	2%
Ten weeks	12%	Twenty-four months	4%
Three months	28%		

It will be seen that 60 per cent. of all cases of trouble occurred in from two to three months after entry. As the nurses are admitted more or less equally through the year, it will be seen that there is another etiologic factor beside the seasonal one just mentioned.

Conditions preceding the Trouble.—In nearly half of the cases no definite cause could be assigned for the trouble. The abnormal conditions preceding the trouble mentioned in the order of frequency were as follows: tonsillitis or diphtheria, rheumatism, change in work, improper boots, confinement to

bed, excessive heat, neurasthenia, trauma, amenorrhœa. Nurses seemed inclined to experience their first trouble during menstruation rather than between the periods.

The relation to rheumatism seemed of much interest. Three or four perfectly typical cases of trouble in the feet occurred in nurses previously free from rheumatism. These cases all proved resistant to ordinary supporting treatment, but in a few days developed signs of general rheumatism. No diagnosis of rheumatism was made in this connection unless the symptoms appeared in the upper extremity, as in the hips or knees they might have been purely irritative and due

FIG. 8. Photograph of a nurse who broke down after three months, and who has been incapacitated from work for two months. In this case the foot appeared to be so good that the regulation boot was not ordered (*American Medicine*).

to the abnormal use of the foot. There was nothing to distinguish them from the ordinary painful affection in the beginning, but in their later course they proved obstinate and long continued. Such patients required support to the arch as much as if the affection were purely static, and derived as much comfort from it.

Another point of interest is that when trouble with the feet occurred during a long period of amenorrhœa it was apt to be most troublesome. In one nurse in a period of severe discomfort, during which she was barely able to get about the ward, menstruation came on, and the trouble at once improved.

Period of Disability.—When it became necessary to take a nurse off duty, it was not done, of course, until it seemed that she would not recover by the use of a proper support while at her work. The period of disability lasted in most

cases from two to three weeks. It always seemed at the beginning as if it would be less, but continued experience showed that, if a nurse had once experienced severe trouble, it was wiser to keep her off duty until the tenderness in the foot had practically disappeared.

No statistical inquiry has been attempted as to the number of nurses having trouble or incapacitated each year, as it would have involved much more labor than it would have been worth. The causes of removing a nurse from duty are often complicated, and any such inquiry would have necessitated a search into the nurses' record in each case as well as into my own records. A fair statement of the case would be that for the last five years some nurses have each year been incapacitated from duty. During these years in a few cases nurses have left the school on account of continued or recurring disability in their feet.

The evidence so far adduced points rather to the general condition of the nurse than to the especial structure of her feet as the cause of the trouble. They have trouble in the spring when they have been housed all winter and when the work in the hospital is hardest. This trouble is more likely to come between the second and third month of their course than at any other time, when the novelty of the situation has worn off, and the fatigue of the routine begins to be felt. The trouble is likely to follow diseases which debilitate the muscles.

Boots.—It is a matter that would be admitted without discussion that, if a person is to undergo a severe test to the foot in the matter of standing, a good boot is better than a bad one. The chances of enduring the strain successfully would be diminished by wearing a tight boot with a pointed toe, a high heel, and a slender flexible shank.

At the time that these observations were begun there was no ready-made boot for women in the market worthy of serious consideration. It was, therefore, necessary to have one constructed on new lines, and in the boot devised and used since that time the following points were aimed at: (1) The

boot should be as wide as the foot in front. (2) The inner edge of the front of the boot should be nearly straight, so as not to displace the great toe outward. (3) The boot should be constructed on a slightly curved line, the convexity being outward so as to hold the foot in its position of strength. (4) The shank should be fairly high and slightly stiff.

These propositions were submitted to a firm of shoe dealers, and a last made on these lines. This boot has been used by these nurses, and has not been radically changed. At first it was made a little too much curved, and was apt to cause corns on the little toe. At one time the shank was made stiffer, but shortly after this there was a good deal of trouble among the nurses, and I returned to the original shank. But this outbreak of trouble was coincident with increased duty on account of the admission of soldiers returning from the Spanish War, and was probably due to that. The boot is not ideal, and may not be the best for the purpose, yet I have felt that experiments were risky, and that I had at least a fair boot, the working of which I understood. My aim, in short, has been not to cramp the foot in front, to support the arch underneath, and to hold the foot slightly curved.

The difficulties have been to get the shoe dealers and the nurse to agree on a boot sufficiently wide in front, and to get the manufacturer to make the last deep enough where the upper of the foot joins the vamp in front. The transverse seam below the lacings has been on the whole too tight and a source of much trouble. If it is made too loose, the front of the boot wrinkles, and the regulation boot and most others are too shallow where the upper joins the vamp in front. In each case the nurse has been given a letter stating her requirements, and the instructions to the dealer have been that, if she could not be fitted properly, she must have a boot made on the same general lines, but suiting her especial requirements. In perhaps 250 nurses the boots were inspected before being worn, but the system was abandoned on account of certain practical difficulties, and since then the nurses' instructions have been to report if the boot was not comfortable. Lace

Fig. 9. Four nurses with flattened or pronated feet, who after months of service had been comfortable. These were classed as "suspicious," at entrance (*American Medicine*).

Fig. 10. Photographs of the standing position in five consecutive probationers at admission. These were taken to show the average foot, and in no one of the cases had there been any trouble (*American Medicine*).

boots are ordered with rubber heels, and low shoes are not allowed except by special permission in selected cases. The boots are made of kid, with a sole of medium thickness. The shank is stiffened by a light piece of spring steel, and the heel is of medium height.

In 130 nurses I made outline tracings of the foot and of the boot worn at entrance, and in practically all cases the result showed a gross disproportion between the size of the boot and the foot. Of later years the style of boot worn at entrance has improved, and there are now in the market several styles of cheap boots which conform fairly well to the theoretic requirements. At one time when a nurse came to the hospital wearing a good boot which seemed to meet the requirements, I did not order regulation boots, but allowed her to wear what she had. But the experience was not favorable to the method, and the proportion of trouble in such nurses was unduly large, and now the regulation boot is prescribed except in very exceptional circumstances.

It is a very common experience to have the slight trouble which very often occurs in the first days of duty immediately relieved on putting on the regulation boot. The outcome of my experience has been that I believe that a good boot diminishes trouble, but cannot prevent it, and that, if nurses were allowed to wear boots of their own selection, there would be much more trouble than there is now; that, as the cause of the trouble seems most often to be found in muscular relaxation due to fatigue and similar causes, the problem is so far as possible to supplement the action of the muscles in holding the foot in its supported position.

Prevention of Trouble.—At the first examination, if the nurse's boot was trodden over to the inside, or if much pronation was present, the inner side of the sole and heel was made one-eighth inch or even one-fourth inch thicker than the outer side in order to tip the foot over onto its outer border somewhat.

Continued experience has not shown that this is a measure of much value, and its preventive effect was small, and in the last year or two it has been used much less than at first. If

the nurse's foot showed a very high arch, an order was given for a boot with an extra high shank. In some of these cases a cork pad was put in at the beginning to support the high arch. In a few cases of very severe pronation, and in one case of traumatic flat foot, metal supports have been put in when the nurse was first seen, with apparent prevention of trouble.

Treatment.—Every nurse has been asked to report at once any discomfort in the feet, but the disposition has been to put off "making any fuss" until the condition had existed some days at least.

In the milder cases the aim of the treatment has been to relieve the muscles from strain and to stimulate the circulation. Felt pads have at once been put in the boots to support the arch, and the nurse has been ordered to soak the feet in hot water at night for ten minutes, and then to shower the feet with cold water, and to bandage the feet and legs with flannel for the night. The majority of early cases have, I think, yielded to this treatment. If, however, rapid improvement has not come on in two or three days, or, if the first symptoms have been severe, a metal support to the arch of the foot has at once been put in and measures to stimulate the circulation have been used, as described above. In some cases plates have relieved the symptoms at once, and have been worn for a few weeks or months, generally to be given up later.

In the severest cases all sorts of expedients have been tried to cure the pain while the nurse continued her work. The most efficient support of all is to apply a felt pad to the instep while the foot is held inverted by fastening the pad to the bare foot by several straps of adhesive plaster which pass from the outer border of the foot under the foot and up under the inner side of the arch over the top of the foot to the ankle. These straps overlie each other, and are covered by a heavy cotton bandage. This dressing must be renewed every day or two. This dressing, which is distinctly more supporting than any metal plate, has in some cases carried nurses over

a painful attack while on duty, but more often it has failed in the severest cases. In these severest cases hot air baths, massage, and stretching of the calf muscles have been faithfully tried with no brilliant success. They have helped the condition, but I cannot recall a severe case in which any one of these latter measures has made any serious difference.

If a proper fitting metal plate fails to relieve symptoms within two or three days, the sooner the nurse is laid off, the better, and the shorter her period of incapacity. When she is laid off, she is not allowed to walk; but, as she convalesces,

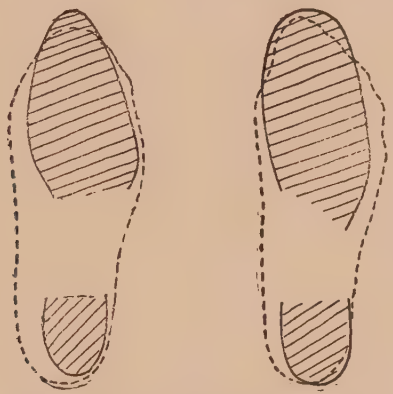

FIG. 11. Feet and boots, typical tracings. The boots are shaded.

she is encouraged to take out-of-door walks, and is not regarded as fit for duty until she can walk a mile or two on brick sidewalks without pain. Several times it has been demonstrated that it was unwise to allow nurses to go on duty under other conditions. Strychnine in fairly large doses has been used in a number of cases in the hope of improving the muscular tone when trouble was threatening, but I have failed to see striking instances of its benefit.

In no case can I recall that a metal plate has been otherwise than helpful. It is often not enough to prevent laying off of the nurse, for the traumatism of constant walking and standing is too great for it to overcome, but as a preventive it is of great value and a great aid in protecting from strain

convalescents from foot trouble. A few nurses have continued to wear plates throughout their course, but the majority have dispensed with them after a while.

A summary of this paper can perhaps best serve its purpose by attempting to answer the questions proposed at its beginning:—

1. It has not been possible to tell with any certainty by examination whether or not the feet of an individual are likely to give trouble. The only reliable information obtained in these cases was given by the imprints seen through glass. A foot with a well-distributed pressure area seemed rather less likely to give trouble than one resting on two islands, the degree of pronation, the condition of the circulation, the relative weight of the nurse, and the dorsal flexibility of the foot all proving of little or no value as elements in prognosis. A flat foot may be perfectly serviceable, as may also a severely pronated one, while an apparently well-balanced foot may become painful.

2. The factors in causing the trouble among the nurses were to be sought rather in the general conditions than in any especial conformation of the foot. It followed in many cases illness and other conditions causing muscular debility. It occurred in most cases from two to three months after entrance, and it began most often in the early spring when the nurses had been indoors all winter, and least often in the fall.

3. The trouble was caused by a rolling in of the foot and a shifting inward of its weight-bearing areas, and not in any case observed by a breaking down or even lowering of the arch.

4. Although proof by figures is lacking, it is probable that the amount of trouble has been decidedly less than it would have been without the use of a proper boot.

VII.

A FURTHER CONSIDERATION OF A MODIFIED FORM OF OSTEOTOMY COMBINED WITH OSTEOCLASIS, —OSTEOTOMOCLASIS.

W. BARTON HOPKINS, M.D., PHILADELPHIA.

The subject of this brief communication may best be described by referring to a preliminary note read before the Philadelphia Academy of Surgery five years ago.

As indicated by the name suggested, osteotomoclasis, the operation to be described consists of combining in a modified form both the operations of osteotomy and osteoclasis to correct a curve or bend of a long bone resulting from congenital malformation, rickets, or vicious union after fracture. Briefly stated, two operations are done, incomplete osteotomy and osteoclasis. At the first operation the bone is divided with a chisel not completely, but through more than one-half of its thickness at its inner curve. After the skin wound has healed, but before repair of the bone has sufficiently advanced to restore the original strength at the weakened point, a period easily included between one and three weeks, the osteoclast is applied, and the deformity corrected by a fracture in the bone at its weak point.

In studying the action of the osteoclast some familiarly known principles relating to the strength of bodies and their resistance to force may be referred to. Letting a square beam of wood represent the shaft of a bone, discounting for the time the variations in form which modify its strength, the manner in which an osteoclast exerts its force would test the transverse strength of such a beam. The transverse strength of a beam is represented by two elements, its resistance to compression of one-third of its thickness and its resistance to extension of the remaining two-thirds, the line of equilibrium at which compression terminates and extension begins being the neutral

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

axis. "The limit of stiffness is flexure, and the limit of strength or resistance is fracture." The limit of stiffness is more easily reached than the limit of strength. If, therefore, a transverse cut is made in the beam on the side to be stretched, the latter will be weakened relatively more than by a similar cut made on the side to be compressed. The side to be stretched or extended will be fractured, whether a cut is made or not, the continuity of the beam being preserved, if at all, at that portion which is only flexed, not broken. What is true of a beam of wood is, so far as present purposes are concerned, equally true of the shaft of a bone. Partial section, therefore, as described, would seem to be a rational preliminary step to osteoclasis by reducing many times the force required by the latter and by locating accurately the point of fracture. The use of the osteoclast to supplement the work of the chisel, where, as in hospitals, this rather cumbersome apparatus is available, is, for reasons presently to be mentioned, advantageous. Whether in certain cases osteotomy may be made a safer operation by combining with it osteoclasis as a subsequent step is a question which can only be decided by experience. In children so poorly nourished and unhealthy that traumatism of any kind is likely to provoke suppuration, the danger of a bone section cannot be ignored. It is in cases, therefore, whose general condition in prudent hands negatives the performance of osteotomy that I venture to propose the modification of the latter I have suggested, as for them I believe it would prove safer. Osteoclasis, although having fallen to a great extent into disuse, is especially useful for correcting trifling curves in tender bones in children whose parents cannot go to the expense and trouble of apparatus necessary for a cure by gradual means. Intelligently employed, it is neither haphazard nor barbarous, and should not, in my opinion, be allowed to become an obsolete operation. But our subject relates to that class to which simple osteoclasis is inappropriate, either because the bone is too hard or the apex of deformity is too near a joint to yield to a degree of force which can without risk be applied: suitable cases, in other words, for osteotomy. Osteotomy causes a compound fracture, the modified method

a simple fracture. Osteotomy produces usually a complete fracture, while by the modified method the fracture is usually incomplete. After osteotomy, fixation is required immediately. By the other method no fixation is required during the existence of a wound. When suppuration occurs after osteotomy (which, however, it rarely does), it is complicated with loss of continuity in the bone,—a suppurating compound fracture. Should suppuration occur after the first step in osteotomoclasis, it would involve only a bone cut, not a bone section, and would be surgically far less serious than if accompanied by loss of continuity. Following the second step, after the skin wound has entirely healed, there is, of course, no risk of suppuration, as the fracture produced is a subcutaneous one. Osteotomy, on the other hand, requires only one etherization, while the modified method requires two. The osteoclast shown in Fig. 4 is the one which has been used in these cases. It is very simple, easily adjusted, and powerful, but is not particularly original. The two counter-plates and the C-shaped clamp can be placed at any point desired on the pair of shears, and retained by binding screws beneath. The apex plate is swivelled to the clamp screw. The pressure plates present concaved faces, and have flanges on their lateral borders to secure the necessary pads in position. It may be said of instrumental osteoclasis that it possesses the great advantage over what may be called manual osteoclasis, in that the force used with it is under perfect control, ceasing instantly the bone yields, producing thereby usually an incomplete or green-stick fracture, while the force applied by manual effort, on the contrary, cannot be so controlled, but goes on with a rush when the resistance of the bone ceases.

Little need be added to this note beyond the mere statement that the modified operation has been performed in most of the osteotomies I have done in order to demonstrate what advantages, if any, it had. It was done indiscriminately in healthy and in feeble children. I may therefore venture the opinion that, while osteotomy is almost invariably free from risk, we have in this modification a procedure occasionally applicable.

VIII.

A CONSIDERATION OF THE "ROUND SHOULDER" OR "STOOP SHOULDER" DEFORMITY IN CHILDHOOD, WITH ESPECIAL REFERENCE TO THE PROPER ADJUSTMENT OF THE CLOTHING IN PREVENTING AND TREATING SUCH CONDITIONS.

JOEL E. GOLDTHWAIT, M.D., BOSTON, MASS.

The frequency with which the "round shoulder" or "stoop shoulder" deformity is met in growing children, without other evidence of disease than the weakness of the posterior shoulder muscles, and the difficulty so often experienced in overcoming this defect, even under careful physical supervision, must have impressed all who are called upon to examine children, and naturally leads to reflection as to the cause of the trouble and its obstinacy under treatment.

The condition is seen more commonly with girls than with boys, and from three to four years of age on to puberty is the period during which the condition is most frequently seen. It is rarely noticed in infants or during the first two or three years of life, and it is a matter of considerable surprise to see children at this period with well-formed round chests and well-poised shoulders gradually develop this weakness as they become older.

With boys the condition is usually outgrown at or before the time of puberty. With girls this is less often the case, and the weakness of the scapula muscles remains to be seen not infrequently in adult life. The condition is naturally seen most often in poorly developed children, but it is also seen in those otherwise strong and well developed, the weakness of this one group of muscles being the only apparent defect.

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11–14, 1903.

In considering the subject, and as the result of the examination of a large number of children, both in the hospital clin-

Fig. 1.

ics and in private practice, it has seemed to me that the chief factor in the etiology of this condition is the improper adjustment of the clothing, especially as the condition develops

as the simple clothing of infancy is discarded and the heavier and more complicated costume of the child is assumed. The opinion is strengthened by the fact that the condition so often corrects itself at the time of puberty, when the arrangement of the costume again changes, the shoulders at this period being depended upon less for the support.

In studying the costume of the young growing child more in detail, it will be seen that all of the heavier garments or those from which any drag could come, including the stocking supporters, are attached to the under-waist, and that this under-waist is carried entirely upon the shoulders. Of these under-waists there are many styles, some expensive and some very inexpensive, but practically all are so made that the weight is applied at the outer or movable portion of the shoulder, the position which is least capable of carrying weight. This is clearly shown with the resulting attitude in Fig. 1. Anatomically, the position of the shoulder is maintained by the clavicle, with its attachments in front and by the scapula muscles in the back. It is evident that anything that causes pressure or drag upon the outer or movable part increases this muscular action, and that, while in moderation the muscles may respond to the task, if the strain be continued during all of the active part of the day, muscle fatigue and later permanent weakness must result. In this condition the shoulder must be depressed or lowered, but from the bony clavicular attachment in front and the ribs supporting the shoulder below when it is depressed it must come forward, and, as it is drawn forward, the posterior edge of the scapula is thrown into greater prominence.

From actual measurements the drag upon the shoulders when the clothing is adjusted represents at least three or four pounds on each side, and, when it is realized that this is expected to be carried not for a few minutes, but for all of the day, the muscle fatigue with the ultimate muscle atrophy is not to be wondered at. If this be of the importance which it is considered by me, the fact that the treatment, without correcting this element, is tedious and often a disappointment is easily explained.

In considering the various waists which are commonly used, not only do they apply the support at the outer portion, that which is the least able to carry the load, but there is also in many of them a strap which draws from the outside of the shoulder to the median line in front, the effect being to draw

FIG. 2.

FIG. 3.

the shoulder not only down, but also forward, thus making muscular resistance still more difficult.

To correct the defects of the garment and to improve the anatomical condition, it has been my plan to apply the weight at the base of the neck, or the rigid part of the shoulder, where any amount can be borne without the shoulder being lowered. At the same time it has been a part of the plan to prevent the drag upon the front of the chest with the consequent flattening.

The waist which has been most satisfactory is pictured in Figs. 2 and 3. It is made of a firm cotton material, and is cut high in the neck with a rather narrow back, but with a loose, easy front. Two straps made of double thickness of the

same cloth are sewed to the waist, and upon these the chief drag comes. The straps start well at the side in front, cross the shoulder near the base of the neck, and cross the back to the opposite hip. In this way the chest is left free, and whatever drag there may be tends to draw the shoulder backward

FIG. 4.

rather than forward. The stocking straps are attached with the side buttons for the clothing at the side just between the ends of the shoulder straps, so that the drag is applied most favorably. The stocking straps should never be attached in front, as this always produces muscle strain with resulting faulty attitudes.

For summer use a skeleton waist has been used, consisting of a wide band at the waist line for the attachment of the buttons, this being supported by straps placed similarly to the straps which are sewed to the other waist. This is pictured in Fig. 4, and the only difference in the arrangement of

the straps is that a cross strap at the back near the neck is necessary to hold them sufficiently high upon the shoulders.

Occasionally, when the stoop shoulder is marked, some additional support may be necessary, and with many of the cases it

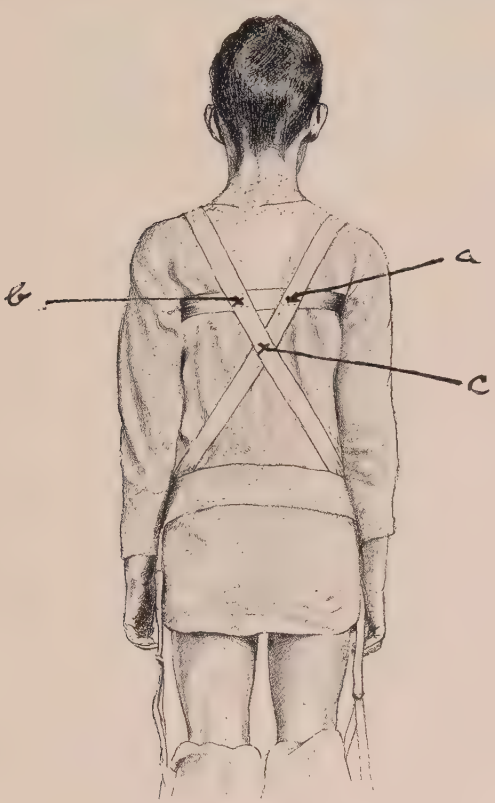

FIG. 5.

has been possible to accomplish the result by using a brace made of firm webbing one inch wide, carried as a loop around each shoulder, the ends crossing in the back, and being attached to the belt of an ordinary stocking supporter (Fig. 5). The attachment of the shoulder strap to the belt should be at the side directly over the stocking straps, and the belt should be worn about the hips, and not about the waist, as they are

ordinarily used. The straps should be sewed where they cross at the back, a and b, Fig. 5, but should not be sewed where they cross at c. This allows all the body movements, both side and forward bendings, without straining upon the straps

FIG. 6.

or changing the position of the belt, as is shown in Fig. 6, the level of the belt not being changed in the movement.

It is at once apparent that with such a brace the pull occasioned by the stocking supporters, which is a very appreciable force, tends constantly to draw the shoulders backward; and, while so simple a brace cannot be expected to take the place of the many forms of apparatus which are used to correct round shoulders, it has, nevertheless, been of real value in many cases.

IX.

THE ABUSE OF FLAT-FOOT SUPPORTS.

WISNER R. TOWNSEND, A.M., M.D.

The treatment of flat foot by means of some form of support under the foot is largely due to the excellent work of many men in this Association, and it seems proper, therefore, that the members of the American Orthopedic Association should call the attention of the profession to the abuse of such supports. The fact that such a question is difficult of solution, and that the motives prompting publicity are often purposely misunderstood, is no reason why we should hesitate to give the proper advice and urge upon medical men the necessity of properly examining and treating deformities or disabilities of the foot.

That the treatment of this condition without consulting a surgeon has become very common is evidenced by the fact that various forms of support are to-day for sale in all the larger stores where footwear can be bought, and the daily, weekly, and monthly lay press, in addition to the medical journals, contain many advertisements of plates, braces, springs, supports, etc., warranted to cure flat feet, perfect in fit, self-adjustable, and easily worn in any shoe.

The diagnosis of flat foot is, as a rule, not difficult, but that errors are quite common cannot be denied, and that even the most expert diagnosticians may at times be puzzled as to the true nature of a valgus deformity must also be admitted. A correct diagnosis is necessary before correct treatment can be instituted, and an error in diagnosis generally means improper treatment.

The most frequent errors in diagnosis are mistaking an ostitis of the tarsus or ankle, a metatarsalgia or neuritis, or an inflammatory rheumatic condition of the parts about the

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

inner side of the foot, for a flat foot. Other errors, but less frequent, are the application of flat-foot supports for pain in the feet due to a cavus deformity, a periostitis of the os calcis, and to extreme grades of malposition after Pott's fractures. In one instance the writer knew of, a sarcoma of the sole of the foot was treated for some time by braces under the idea that the deformity, disability, and pain were due to a flat foot. Ostitis of the tarsus or ankle is not a rare affection, and the writer has seen many such cases treated for flat foot. The patient received no benefit from the support used, and in most instances was made much worse by the pressure and the traumatism of locomotion. A careful inspection of the foot, an X-ray picture, the atrophy of the calf, the presence of reflex muscular spasm, are usually sufficient to render a differential diagnosis easy to a medical practitioner, but the symptoms cannot be properly interpreted by those who have no medical knowledge, and all such cases must necessarily be treated badly if they simply buy supports under the idea that they have flat foot. In inflammatory rheumatism or neuritis the same is true, and many patients continue to suffer until proper treatment is given, and generally are made worse by the use of the support.

All the other conditions referred to have been seen, and the effort to increase an exaggerated arch, as in cavus, is not at all uncommon. The proper treatment of such cases is entirely different.

When flat foot does exist, it does not necessarily follow that a support must be applied, because there are contra-indications for their use. Extreme spasm, extreme deformity, or inflammatory conditions, may be present, and the use of a support do more harm than good. These contra-indications are well known to the profession, but not to those who simply buy supports as they would buy any article of clothing. Another damage resulting from the indiscriminate use of supports and their application to all cases, suitable and unsuitable, is that many mild in type and easily cured by medical men are allowed to grow worse under this faulty plan of treat-

ing a foot disability by those without medical knowledge. Patients with disability so slight that any medical man could easily cure it, if seen when the supports were applied, may go on and become so seriously crippled that long-continued treatment and even operative procedures may be necessary to restore the foot to the normal, and perfect restoration may even be impossible.

Another error of treatment, which is the one that especially deserves to be considered, is the application of supports that do not fit, that do not fulfil the indications for treatment, and that are so poorly constructed that even from the standpoint of their makers they in no sense of the word act as supports, because they are so frail or weak they can barely retain the position or shape they were made, and lose all semblance of it as soon as weight is put on. That supports which simply tend to push up a broken-down arch can never cure a flat foot is not disputed by medical men, but a support to hold up weight must be strong enough to maintain its shape under the weight, yet many patients are to-day wearing supports that do not support, and that are simply flat pieces of metal interposed between the sole of the foot and the shoe. In many cases the support is applied so far forward or so far back that it is of no assistance in preventing deformity, and more frequently tends to increase than to diminish it. Deformity may actually be produced and disability caused by the use of improper supports, and a flat foot produced where none existed when the use of the support was begun.

For the patient with a flat foot, who is his own surgeon or whose attention is called to the condition of his foot when purchasing shoes, there is but one kind of treatment,—the application of the support sold at that store. Of necessity many cases must be badly treated under these conditions. Many forms of supports exist, and no one can successfully treat the condition who has but one prescription for its cure. Different cases require different treatment, and this is the most important point in the discussion. The principles are not understood. The valgus or abduction of the foot must

be overcome, the weakened structures must be strengthened, the free and normal motions of the foot must be restored, the deformity overcome, the patient made to walk as patients with normal feet should walk, and the application of a support simply intended to push up a weakened arch can never accomplish this. Temporary relief may be obtained, but never a cure where a true and severe degree of flat foot exists. A proper support may be applied, and all its benefit lost by an improper shoe. Perfect reduction of deformity may be gained by the use of a support, and by not strengthening the muscles and cultivating normal movements the foot may be still further weakened rather than improved. A badly fitting support will do harm where the same support might be of great service if properly made. Very slight degrees of flat foot may not need supports, very severe degrees may need operative procedures. Talipes valgus, whether complicated by equinus or calcaneus, cannot be treated in the same manner as mild degrees of flat foot.

The form of support will vary, individual preferences will prevail, but the treatment of flat foot should be carried on by medical men. Supports, if used, should be correct in principle and properly made, and the routine practice of patients treating themselves or being treated by ready-made supports sold by those with no knowledge of the true anatomical or pathological conditions actually present should be discouraged.

DISCUSSION.

Dr. ROYAL WHITMAN, of New York, said he heartily agreed with the reader of the paper. He would like to call attention to the fact that little children with pigeon-toes almost always had weak feet or knock-knees. These children were apt to be taken to shoe stores, and have the shoe raised on the outer side. This symptomatic intoeing was often noticed by the mothers long before they noticed any more serious deformity.

Dr. R. TUNSTALL TAYLOR, of Baltimore, said he had seen a number of cases, on making impressions, in which there was a definite varus. These children were accordingly etherized, and the contracted tissues stretched or cut on the inner side. He had recently seen a case bear-

ing on Dr. Townsend's paper, in which the patient had been made steadily worse by wearing a foot-plate prescribed and made by an instrument-maker. The foot was held more abducted by the plate than it had been without it, and was therefore more painful.

Dr. WHITMAN said he had understood the last speaker to say that ordinary pigeon-toe was more often a deformity of the foot than a symptom. He could not agree with him on this point, and he thought it was worthy of discussion.

Dr. H. AUGUSTUS WILSON, of Philadelphia, said he had been very much impressed with the amazement of the parents when told that the former bracing or supports were wrong. Of course, like others, he had found it difficult to argue with them and convince them that they had been wrongly persuaded. He had succeeded best in this by asking if they had ever heard of those about to engage in a boat-race having their arms splinted and staying in bed in order that they might not become tired or the weakness increase at the time of the race. This way of putting it seemed to appeal to them more easily than more elaborate arguments or explanation. Physicians had been opposing drug-store prescribing, and ophthalmologists had opposed the prescribing of eyeglasses by opticians, yet it was very difficult to overcome these practices.

Dr. NEWTON M. SHAFFER, of New York, said it had gotten to be so in his city that, if any one had a pain in the foot, he would go to a shoe store or clothing store and get a flat-foot plate or some special shoe. Some of these plates were made of metal, while some shoes were so made as to produce the same effect. He knew one patient who went to a department store in this way because she had learned something about flat foot and shoes from the paper presented by Dr. Lovett.

Dr. GOLDTHWAIT said he agreed with all that had been said in the paper, but he thought there was a class of cases in which the patient was undoubtedly flat-footed, which he had been in the habit of treating with flat-foot plates, and in which he had been able to obtain practically no improvement. In such cases he had largely given up the use of flat-foot plates. These cases were instances of rigid or extreme valgus in which it might be possible under ether to effect partial correction, but in which by all the methods of manipulation it was impossible to thoroughly over-correct the feet. Many such cases came to their clinic after having had all sorts of manipulations. Within the past few months they had recognized these cases as examples of club foot of the valgus type, and they have been treated just as they would treat a persistent case of obstinate valgus. They had usually excised the scaphoid, thus shortening the inner side of the foot, after which the cor-

rection of the position was easy. He was sure the blunder had been in depending upon foot-plates when there was a definite deformity requiring a surgical measure. The class was a definite though not very large one.

Dr. R. TUNSTALL TAYLOR said, replying to Dr. Whitman, he did not mean to imply that *all* cases of turning the toes in were cases of contraction of the inner structures or varus deformity, but tracings of *many* cases showed that the angle of deflection was greater than 35°, and that the inner structures were the ones at fault.

X.

THE IMPORTANCE OF SUPPLEMENTING TENDON TRANSPLANTATION IN THE TREATMENT OF PARALYTIC TALIPES BY OTHER PROCEDURES DESIGNED TO ASSURE STABILITY.

ROYAL WHITMAN, M.D., NEW YORK.

To estimate accurately the permanent improvement derived from the operation of tendon transplantation for paralytic talipes, one should consider it apart from the procedures with which it is usually combined.

These are the removal of contractions and deformity by tenotomy and by force, supplemented by long-continued fixation in an attitude of over-correction.

Functional use of a part so fixed and protected is often followed by the unexpected development of weak muscles, which, with the adaptation of the tissues to the improved attitude, assures for a time at least a very marked improvement both in appearance and function of the foot. If one adds to this the negative effect of the removal of the distorting force of the transplanted muscle, it is very often apparent that the positive gain in functional ability due to the transplantation itself is of small moment.

I am inclined to think, therefore, that those who have had considerable experience in the operation, and the opportunity to analyze critically the later results, will admit that tendon transplantation, in its original form at least, is, on the whole, a disappointment.

The limitations of treatment in cases of this character are, of course, evident; for, as all the muscles and the normal degree of muscular power are necessary for perfect function, it follows that the disability caused by paralysis will be proportional to its distribution and degree.

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11–14, 1903.

The simplest and most important function of the foot is weight-bearing, which is possible even when no muscular power is exercised. Next in importance is plantar flexion, in which the leverage force of the calf muscle is employed; then dorsal flexion to prevent toe drop; finally, adduction and abduction.

The object of operative treatment is to adapt, as far as may be, the disabled part to the work it is called upon to perform. In this the first essential is the prevention of deformity, which is often more disabling than loss of power.

It is, of course, evident that the operation of tendon transplantation, of which the object is the utilization to best advantage of the muscular power that remains, should be most effective in the slighter grades of paralysis, and that it is practically of no value when this is severe and extensive. It is particularly indicated in cases of paralysis of one of the anterior leg muscles, with consequent lateral distortion; yet, even in this class, recurrence of deformity is rather the rule than the exception. In some instances the relapse may be due to insecurity at the point of attachment or to elongation of the overburdened graft, but the most constant cause of failure is the mechanical disadvantage at which the transferred muscle must do its work. This advantage may be lessened by disregarding the tendon of the paralyzed muscle and attaching the transplanted tendon directly to the periosteum at a point of selection, as advocated by Lange. To assure the security of this attachment, I have for some time inserted the tendon or its silk prolongation through a hole bored in the bone itself.

The point to which I wish to call particular attention, however, is the importance of reinforcing the comparatively ineffective operation of tendon transplantation by procedures designed to prevent deformity and to lessen the strain upon the weak muscles. The centre of lateral motion of the foot, and consequently of lateral deformity, is the medio-tarsal joint; and, whenever the principal abductor or adductor of the dorsal flexors is lost, the remaining muscles, although possessing sufficient power to raise the foot at the same time, draw it to one or the other side.

The indication for treatment is to check lateral mobility. Lateral motion is, of course, of value in a normal foot, but it is of little consequence in one weakened by paralysis, and it is a distinct source of weakness if it induces deformity.

The most common and most important form of acquired disability is that caused by paralysis of the tibialis anticus muscle, whose loss is always accompanied by valgus and by sufficient toe drop to increase the discomfort and awkwardness.

The operation that I recommend in a typical case of this character is conducted somewhat as follows. After all restriction of motion has been overcome by forcible manipulation, an incision about two inches in length is made along the line of the tendon of the tibialis anticus muscle, the lower end of which exposes the lateral aspect of the astragalo-navicular articulation. This joint is opened, and the cartilage is thoroughly removed from the apposing surfaces of the bones, or, if the valgus is extreme, a wedge-shaped section, including the joint of sufficient size to insure slight varus, is removed. The extensor proprius hallucis tendon is then divided at a point about one inch from the toe joint, is drawn through a hole bored in the navicular, and is sutured to itself and to the periosteum at a sufficient tension to hold the foot in normal position. In most instances the tibialis anticus tendon is shortened to the same degree. The foot, the tendo Achillis having been divided if necessary, is then turned to a position of slight adduction and dorsal flexion, and the divided tissues over the joint are sutured, with the aim of holding the denuded surfaces of the bones in close apposition. The foot is then fixed in a plaster of Paris bandage for three months or longer, the patient using the part in walking as soon as the discomfort following the operation has subsided. As a rule, in the cases in which supervision is exercised, no apparatus is required, but a brace should be used if power is lacking for dorsal flexion.

It may be stated that in the treatment of children the hole in the bone is made by means of a curved trocar and canula. This latter is essential in order that the tendon may be drawn

through without violence. It might be supposed that the complete removal of its tendon would be followed by the dropping of the great toe, but in these cases there is almost always hammer-toe deformity, and the power of the accessory muscle (extensor brevis digitorum) is quite sufficient to hold it in proper position.

In the treatment of varus caused by paralysis of the peroneus brevis, the foot should be fixed in abduction after arthrodesis. In this case the hallucis tendon should be attached to the cuboid bone, or, if a graft is taken from the tibialis anticus, it is elongated sufficiently with silk to permit this attachment. If the varus deformity is extreme, a wedge-shaped section may be taken from the outer border of the foot to include the calcaneo-cuboid joint.

When the calf muscle is paralyzed, and especially if the resulting deformity is of the calcaneo-valgus or varus type, I have found the most effective operation to be astragalectomy, with backward displacement of the foot upon the leg, removal of the cartilaginous surfaces of the apposing bones, transplantation of the peronei tendons to the os calcis, shortening the elongated tendo Achillis, being minor parts of the operation. The removal of the astragalus and backward displacement of the foot restores symmetry, increasing the security of the support, and assures the patient from recurrence of lateral deformity. Although arthrodesis is performed, ankylosis is exceptional: thus the transplantation of the peronei tendons may utilize the slight muscular power of these lateral muscles to check dorsal flexion.

I am inclined to think that a slight degree of mobility at the ankle joint, if it does not lead to deformity, is preferable to the fixation that may be attained by simple arthrodesis. It is true that, if a paralyzed foot is supported in proper position by a well-fitting plaster bandage or brace, the patient may walk with ease, but the same freedom is by no means assured when the weakened part is subjected to strain. In my own experience discomfort persists for a long time after the operation, unless the foot is protected by apparatus, a discomfort

which is unusual after astragalectomy. In this operation which I have already described to the Association (*American Journal Medical Sciences,* November, 1901), tendon transplantation occupies a very subordinate place; but I have mentioned it in this connection because further experience has demonstrated its usefulness, and because it illustrates the principle to which I wish to call attention. That the object of operative treatment of paralytic disability is not perfect functional cure, but a restoration of ability to the degree that may enable the patient, in favorable cases, to finally discard apparatus. In this result stability is the first essential.

DISCUSSION.

Dr. GOLDTHWAIT said that this presentation of the subject seemed to him very timely. He had been very much impressed with the numerous statements that had been made about tendon transplantation, as if the reattachment of a tendon was expected to make a normal part of a deformed one. As Dr. Whitman has just said, it is one of the procedures that is to be used in correcting certain types of deformity resulting from infantile paralysis, but that it did not do away with a great many other supplementary measures. There could be no question but what tendon transplantation had its place as a surgical procedure. If the patient had a muscle which was deforming a foot, it could be made to do the work, to a slight degree, perhaps, that the paralyzed muscle had done, and improve the patient's gait. In the favorable cases it made it possible frequently to discard a very clumsy brace and substitute a lighter one. Exceptionally, it was possible to discard all apparatus, but in most cases some apparatus was needed because a weak part was left behind. He was sure it was better to make the attachment to some stable base, such as the bone periosteally. Some of the most satisfactory cases functionally that he had seen were those in which the operations had been performed upon the thigh in reattaching the sartorius, gracilis, or biceps muscles. Without the operation it had been necessary for the patient to walk with the hand holding the thigh in extension, or else make use of apparatus for this purpose. By the transplantation of the sartorius, the biceps, or the gracilis, although the part was functionally weak, there was frequently enough support in the muscle to steady the leg and allow the patient to walk upon a level surface without any support. Frequently there was sufficient strength in the sartorium to allow of the patient's sitting and horizontally extending the leg. In a case shown in

Boston at a recent meeting the child wore an ordinary club-foot shoe for support at the ankle, and yet it was able to sit in a chair and hold the leg out perfectly straight with the brace applied.

One other result in tendon transplantation had perplexed him considerably; *i.e.*, along the sheath of the tendon, in its previous location, a cicatrix occasionally forms, just as it forms between the divided ends of a tendon after a tenotomy. This later on organized and gave the tendon a double pull. This he had seen especially in connection with the transplantation of the posterior peroneal tendons, where it was difficult to destroy the old sheath. These tendons, therefore, later on pulled in the line of the old attachment as well as in the new attachment, which resulted in a diversion of a considerable portion of the power.

Dr. H. A. Wilson said he felt personally indebted to the reader of the paper, especially because it would tend to remove a prevalent opinion among the profession that tendon transplantation was a sort of cure-all. Frequently he had had cases brought to him with one or two muscles still active, and with the hope that these muscles could be used to restore the original function of the part. When Nicoladoni's enthusiasm reached the clinic in Vienna, much work was done in tendon transplantation; but it was very quickly abandoned, probably because the operation had been looked upon as largely curative, and no supplementary measures or apparatus had been used. He would like to ask Dr. Whitman whether the method he described was original, or whether it had been described about a year ago by some German surgeon. He was under the impression it was referred to last fall in the British *Medical Journal* as an original procedure.

Dr. Whitman said that he had been interested in Dr. Goldthwait's statement. Lange claimed that tissue formed around silk which had been used to lengthen tendons, and that in this way a cicatricial tendon could be formed which would do the work of the original tendon. He had employed the method of boring holes in bones whenever this was feasible. He did not know that any one else had done it except, perhaps, Wolff. He did not know the exact technique followed by Wolff, and he did not personally claim any special originality for the method. The operation of arthrodesis made the transplantation of the hallux tendon effective, whereas otherwise it would be ineffective. If one could prevent the recurrence of the valgus, the result would be satisfactory, otherwise it would not be. It was to the combination of procedures, which had not to his knowledge been especially urged before, that he desired to call attention.

ABSTRACTS.

SCOLIOSIS.

1. **An Experimental Contribution to the Study of Scoliosis. The Influence of the Erector Spinæ Muscles upon the Spinal Column of Rabbits.** From the laboratory of the surgical clinic, Bern. By Dr. C. Arnd, Privatdocent and Sekundärarzt of the surgical clinic. 47 illustrations. *Archiv für Orth., etc.*, Bd. I. Heft 1 & 2.

The author discusses the etiological theories of scoliosis at considerable length, showing how widely discordant they are and how important it is that experimental work be done to reconcile them. He then analyzes the experimental work of Lesser, Motta, Ribbert, and Wullstein, and describes the results of his own work on rabbits, in which he studied the effect of one-sided weakness of the backs of animals produced by excising a portion of the erector spinæ muscle of one side in the region he desired to study.

In the first experiment (age of rabbit not stated) Arnd cut out the erector spinæ on the right side between the tenth rib and the third lumbar vertebra in November, 1900. The rabbit died in March, 1901,—a period of about four months. During life a curvature developed with convexity to right. Post-mortem examination showed a right convex scoliosis from the twelfth dorsal to the third lumbar vertebra, below this a left convex lumbar-sacral compensatory curve. The sacrum was 1 mm. longer on the left side, and the top of the sacrum was twisted 15° dorsally on the left. The fifth lumbar vertebra shared in lesser degree in the twist, and was 3.35 mm. shorter on left side. In the fourth lumbar vertebra was found the beginning of the right convex curve, which reached its maximum at the second lumbar vertebra, and was recognizable in the eleventh dorsal vertebra. The deformities of the vertebræ showed the characteristic shortening on the concave side and torsion backward to the right from the fourth lumbar to the twelfth dorsal inclusive, the torsion in each vertebra between upper and lower faces varying from 6° to 15°.

He operated on several other rabbits, and got uniformly a scoliosis with convexity toward the injured side, and with greatest deformity in the region of operation, but with certain variations, which he considers so significant as to lead him to state as the conclusion from his experiments that the fundamental curve is convex toward the strong side (near the rump), and that the convexity toward the weaker side higher up is secondary, and results as a compensatory curve from the efforts of the animal to walk so that the hind legs will follow the front ones properly.

He calls attention to the fact that in artificial scoliosis the bones are normal as to growth conditions and solidity, and that in animals going on four legs we get inequalities of muscular pull rather than of weight pressure and consequent muscular effort, and therefore such experiments do not have much value in the study of human scoliosis.

He gives a bibliography of 84 titles.—*G. W. Fitz, Boston.*

2. **Orthopedic Gymnastics.** By Mme. Nageotte Wilbouchewitch. Paris: C. Naud. 1903.

In a book of over three hundred pages Mme. Wilbouchewitch describes the origin and treatment of faulty attitudes. After a brief statement of the pathological anatomy of scoliosis, she describes faulty position when at rest

and positions while working which cause deformity, with photographs and detail of each position. After this, methods of measurement of scoliosis, kinds of scoliosis and their treatment, are considered. Prophylactic precautions in school and at home are suggested. The work is too long to describe in detail. It is full of illustrations.—*Robert Soutter, Boston.*

3. **"Corrector,"** an apparatus for the treatment of deformities of the spine without a corset. By Theodor Wohrizek, Prag. 11 illustrations. *Archiv für Orth.*, Bd. I. Heft 1.

This is an apparatus devised by Dr. Wohrizek for the correction and treatment of deformities of the spine, which is to be only temporarily applied in the office or in the school. Wohrizek does not favor the corset, as it immobilizes the muscles and interferes with the functions and development of the vital organs. The apparatus is described and fully illustrated in this article. It has for its fundamental principle a statistical method of causing an asymmetrical corrective pressure of the scoliotic region. He claims special value for it in the treatment of scoliosis, and that it may be used in schools with a work desk especially designed to go with it.—*D. Townsend, Boston.*

4. **The Correction of Spinal Curvatures.** By v. Modlinsky. pp. 580.

The author describes his method of treating Pott's disease and such scolioses as are past treatment by the simpler methods of hygiene and gymnastics. He begins by making forcible extension of the whole spine in an horizontal apparatus of his own device. This is maintained by the application of plaster, always including the head. Scoliotic cases should be prepared by mobilization and forcible massage. The final correction is assisted by the inclusion within the plaster dressing of suitable pressure pads. He requires for the complete correction of these cases from three to six months and from three to four applications.

The results obtained in this way are, however, deceptive. The correction has been too rapidly made and at the expense of the patient's health. It cannot, for this reason, be maintained. It is more rational to expect success from portative apparatus, attempting in this way to imitate our methods in treating similar chronic conditions of the joints. The difficulty has lain in the absence of truly effective apparatus.

This is to be constructed after the Hessing type. It consists of a light steel and leather corset, embracing pelvis and thorax to the middle of the scapulæ. Fixation is accomplished by means of slots and screws. Attached to the pelvic part, in the region of the trochanters, are two lateral uprights of steel, supporting rectangular frames, whose function it is to transfer the weight of the head to the lower extremities without the aid of lumbar and thoracic segments. Transverse bars attached to these frames carry the anterior and posterior pressure pads, respectively. The head piece is a leather "Minerva," resting upon the upper horizontal bar of the rectangle.

The illustrations of the apparatus are satisfactory.—*A. H. Freiberg, Cincinnati.*

5. **Differences in the Scolioses of Male and Female Individuals.** *Zeitschr. für Orth. Chir.*, xi. 298.

A. Sutter finds that the relation of scoliotic male patients in sanatoriums to female patients is as 1:.7: in school statistics, however, it is as 1:1. Scoliosis, therefore, is as frequent in one sex as in the other. It occurs somewhat earlier in the life of females than of males. The greater number of the vertebral distortions are convex toward the left, but there are more distortions to the left in males than in females. In boys it is usually the upper portions of the spine which are deformed: in girls, the lower are deformed almost as often as the upper. The deformities are more marked in boys than in girls. [E. L.]—H. A. *Wilson, Am. Med.*

6. Congenital Scoliosis. *Zeitschr. für Orth Chir.*, 1903, xi. 411.

H. Maass reports such a case in an infant three months old. The scoliosis was convex toward the left side; its point of greatest prominence was at the height of the ninth thoracic vertebra; the deviation amounted to 3 cm.; the costal deformity to 2 cm. The remainder of the skeleton seemed perfectly normal. He sees the cause in an anomalous intra-uterine position. The treatment which produced an excellent result consisted of a plaster dressing and pressure massage of the deformity. [E. L.]—*H. A. Wilson, Am. Med.*

7. Anatomical and Clinical Value of Orthopedic Corsets. By Dr. Wilhelm Becker, Bremen. *Archiv für Orth.*, Bd. I. Heft 1, 1903.

The value of a spinal support depends upon the consideration of the spine from an anatomical mechanical standpoint. So considered, we must regard the vertebral column as firmly fixed below by the pelvic girdle and freely movable in the part above. In relieving the spine of the weight of the head, the head support should not grasp under the chin, but by the occiput and forehead. The arm-pits cannot be considered support points for the spine, for the shoulder-girdle is only loosely attached. It is further to be remembered that the spinal column is only approachable from behind. In Pott's disease it is important that the appliance fits snugly over the hips, for on that depends our ability to get pressure against the knuckle. If the corset is merely for support, it would have to reach no higher than the knuckle, and the higher that is, the easier to get support; but a jacket which reaches above the knuckle prevents lateral deviation. Lumbar kyphosis is difficult to treat, because the distance to the knuckle is so short, and because the normal lordosis is obliterated or reversed. There are four things to be gained by corsets: (1) fixation; (2) support; (3) extension; and (4) correction. Fixation corsets are to be worn day and night; and, if they are to be removed, it is well to do so under suspension. Fixation implies support, but support without fixation may be indicated in cases of long standing. Both fixation and support can only work on small parts of the column. Extension has its effect on the whole. One grasps both ends; namely, pelvis and head, not the arm-pits. Extension may be used to correct; but the only other way to get correction is by pressure upon the ribs, which are bound to intervene between jacket and spine. There are four groups of chest deformity: nervous, rachitic, spondylitic, and habitual, which have their special indications for mechanical support. The Wullstein corsets are of great value because that part of the treatment is only one link in a therapeutic chain, being preceded or accompanied by other measures.—*Henry Feiss, Cleveland.*

8. School and Spinal Curvatures. By Schulthess. Voss: Hamburg. 1902.

Schulthess denies that the school is the only or even the principal cause of lateral curvature and round shoulders, on the ground that a great many of these cases are seen well advanced before the school age. Institutional experience does not compel the belief in a special form of school scoliosis. The frequent occurrence of left lumbar convex and right dorsal convex forms is explainable in part by the normal mechanics of the spine and by certain pathological conditions of the vertebræ. Right-handedness and the displacement of the pelvis toward the left, as well as the incurvation of the spine toward the right associated with it, flattening of the bodies by the aorta, and the slight inclination of the spine toward the left caused by this, all influence the form of the curvature. All school investigations show about an equal frequency in boys and girls (boys, 23 per cent.; girls, 26.7 per cent., in Lausanne). As age advances, the frequency in girls increases almost threefold, in boys not quite twofold. On the average, one finds somewhat more than double the number in the oldest children, found in the classes corresponding to the ninth year. This indicates as much the progress of old scolioses as the formation of new.

56 per cent. of all scolioses are total. The lumbar follow with 20, dorsal

12.7, and combined with 8.5 per cent. Increase of total scolioses forms the main contingent in the added frequency of scolioses. In addition, the lumbar curves of girls show a decided increment.

The result of the Lausanne investigation has been to show the increase of total scoliosis and the lumbar curves in girls. Schulthess says that the position in writing gives the spine of a child naturally disposed to yield toward the left an opportunity to assume this position often and to maintain it for long periods. He therefore regards sinistro convex total scoliosis and the lumbar curves of girls as forms especially favored by school occupations, and therefore justifiably called "school scoliosis" in a certain number of individuals. Curves whose beginnings were indicated before school life are accentuated. Sitting, lack of exercise, etc., favor the further development of the abnormal growth already begun; but the school is not entitled to all of the blame.

In prophylaxis he recommends shortening hours, insists upon hourly pauses, regular gymnastic exercises, proper illumination, suitable furniture, perpendicular writing, and frequent examination of pupils. Decidedly deformed children should be put in special classes.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

9. The Correction of Severe Scoliosis and Kyphosis. By Schanz. *Wien. klin. Rundschau*, 1902, No. 51.

In proper cases this is the most successful method of treating severe cases. By forcible correction, however, we can accomplish only the straightening. The process itself can only be terminated by restoring the balance between the functional potency of the spine and the functional demands made upon it. The redressment is made in his extension frame by applying a well-padded plaster dressing from trochanters to head under powerful extension. During the setting further correction is made manually. After three to four days the procedure is repeated, and again after similar intervals, until no further improvement can be obtained. He has noticed as much increase of body length as 18 cm. After one and one-half months this dressing is replaced by a hardened leather and drilling corset with head support. During the night a posture bed is used. Energetic treatment by gymnastics and massage is now given. The treatment is not concluded until the patient holds himself in the corrected position. Exercises and the corset are continued for several years longer.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

10. Clinical Observations on Backache. Robert W. Lovett. New York *Medical Journal*, May 30, 1903.

From an orthopedic standpoint certain well-defined types of backache present themselves which are divided roughly into two groups, those due to causes existing in the spine itself and those due to external causes. Among the first is faulty spinal attitude, in which the extra strain is borne by certain ligaments not calculated for them. In round shouldered, lax-spined young women, pain is not infrequent, and is familiar under the name of irritable or neurasthenic spine. In lateral deviation of the spine, when due to a shorter leg on one side, pain is not uncommon, and is often situated in one or the other of the sacro-iliac joints, or in the loin or around the scapula. The pain is on the convex side of the curve rather than on the compressed side. The correction of the shortened leg by a thick sole will in many cases do away with the backache. The cases due to injury or trauma include sprains of the back, which are often serious, far more so in their symptoms than would be suggested by the anatomic conditions. Instead of being put to rest like an injured ankle, it is the rule that the parts are kept in action, and the treatment is therefore embarrassed. In chronic or acute sprain absolute rest and fixation are necessary, or their restricted use. There is also a persistent backache without obvious cause. Three conditions of the foot are mentioned, such as flat foot, which is not common in private practice; pronated foot, which is more common, the weight of the body being transmitted

diagonally through the arch instead of straight down, and pain and irritability result. This is most commonly called flat foot, but it outnumbers the cases of real flat foot many times over. Another condition is what is called contracted foot, which is very little known and but imperfectly understood. It is characterized by shortness of the muscles of the back of the calf, and their stretching is necessary in the treatment. Backache is a common accompaniment. The pain from these three conditions is generally in the small of the back, and is aggravated by stooping or standing. It also results from walking. The real flat foot and pronated foot are easily treated by foot plates, and the backache disappears if this is the cause. In case of contracted foot, stretching of the calf muscle is necessary, and the under side of the foot must be supported by a pad or a short steel plate. The arch of the foot must be correctly supported.—*Abst. in Jour. Am. Med. Ass'n.*

SPINE.

11. Tillman's "Genesis and Treatment of Spondylitic Paralysis." *Von Langenbeck's Archiv*, vol. 69, Nos. 1 & 2.

Spondylitic paralysis is comparatively rarely brought on by direct bone pressure. This happens only (1) by bone edges when the spinal cord has been fixed by dural adhesions; (2) by sequestræ; (3) by callus, this usually in the older, more nearly restored cases. Paralysis may come on also in consequence of peridural connective tissue increase. During the course of spondylitis itself, paralysis is most frequently caused by exudation, abscesses, and caseiform products of decay. Later on, in the natural course of events, by peripachy-meningitic granulations. Much depends upon the pressure to which an epidural exudate has been subjected. A lessening of the pressure is followed by a yielding of the paralysis. It is for this reason that often synchronously with the formation of a superficial abscess there comes a general improvement. Pressure causes an œdema within the spinal cord, which undergoes in consequence trophical disturbances. Duration of the process is less important than intensity of pressure. Losses of nerve substance can never be made up.

The treatment is a bloodless orthopedic one. Extension and redressing apparatus for rest and support should be considered. Even after the paralysis has begun to improve, the vertebral column should be kept in fixation as long as possible. "Kyphosis" not yet fixed, and not too old, can be redressed by degrees. Of course, in the perfectly fixed and very old cases, this cannot be done.

Operations.—Two methods: —

(1) An opening into the vertebral bodies from the side and a permanent drainage. The best method of performing this is the costo-transversectomy of Ménard. This will be applicable in the not too old cases of tuberculosis of the vertebral bodies.

(2) Laminectomy, especially in cases of caries of the vertebral arches, and as a late operation in the older, nearly cured cases, in which granulations, callus, sequestra, and bone edges have been the causative agents.

Every operative procedure must always be followed by long orthopedic after treatment.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

12. On the Casuistry of the "Bechteren" Stiffness of the Vertebræ. Dissertation of inauguration (F. D.), Jena, 1902. By H. Vollheim.

A discussion of one case of stiffness of the vertebral column limited to the lumbar region. The case therefore was very like that described in No. 1 of the *Archiv's* referates, the essential difference being that in one an infectious (influenza) origin was supposed, while the other case followed pure traumatism. The author sifts the significant cases, but believes it impossi-

ble to completely separate the Bechteren and the Strumpell-Marie types.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

13. The Presentation of Diseases of the Spine by Roentgen Rays. By P. Sordeck. Hamburg: Eppendorf. *Archiv für Orth.*

Dr. Sordeck discusses the difficulty of examination of the spine, and shows the value of the Roentgen rays in determining the presence of disease and its site. He claims the best success is obtained in the cervical region, in spite of the small bodies and processes of the vertebræ, then with the lumbar, and lastly with the dorsal region, which is most difficult, owing to its close proximity to heart and liver. In order to obtain success, the observer must make a systematic study of each vertebra, and must take many plates of each case. He also describes the technique to be observed. Then follows a description of the various regions of the normal spine and their peculiarities, as shown by the Roentgen rays, and the pathological changes of the spine and vertebræ in scoliosis, fractures, luxation, and luxation fractures, tuberculosis, caries, cold abscess, malignant tumors, ankylosing spondylitis, and congenital deformities (spina bifida, etc.). He gives a series of clinical cases with analyses of the radiographs of each. The article is accompanied by 19 Roentgen pictures.—*D. Townsend, Boston.*

14. Localized Traumatic Inflammation of the Vertebral Column. By Bettmann, Leipzig. *Archiv für Orth.*, Bd. I. Heft 2, 1903.

The article is a discussion of a case of injury to the spine to illustrate the far-reaching effects of what is often mistakenly called a sprain or stretching. The medico-legal aspect is considered. Objective signs may be entirely lacking. In the case in point the patient complained for many years of pain and disability, and finally deformity came on. There was marked stiffening and lordosis in the lumbar region. The course and pathology of such cases is given, and the condition designated as traumatically ankylosed spine.—*Henry Feiss, Cleveland.*

BONES AND JOINTS.

15. The Development of the Radiograph. By G. C. Johnson. *Journal of Advanced Therapeutics*, April, 1903, p. 224.

Johnson gives some practical hints on the proper development of an X-ray plate. He emphasizes the necessity of becoming thoroughly familiar with one kind of developer, as a great deal of time is wasted by the average man in experimenting with plates and developers. By trying all that there are on the market, one may know much about developers and very little about development. By constantly using a developer of known value, one learns how to modify it to suit the various exposures. As a rule, it is best to use the developing formulæ that are found in all boxes of plates. It must be borne in mind that an X-ray plate requires developing to a much greater density than for any other purpose. For an over or under exposed plate the best remedy is to throw it away, and make a proper exposure. An under-exposed plate is never satisfactory. The secret of success is to learn the capacity of your machine under varying conditions and to judge the current passing through the tube, and govern the length of exposure by the quantity and penetration of the rays emitted during the exposure. Balance these against the size, weight, and muscular development of the patient. In this way only can a correct exposure be formulated. The successful radiographers are those who use one brand of plate, one developer, a given type of apparatus, and a tube with whose every mood they are familiar.—*L. A. Weigel, Rochester.*

16. The Roentgen Rays: In Differentiating between Osteomyelitis, Osseous Cyst, Osteosarcoma, and Other Osseous Lesions, with Skiagraphic Demonstrations. By Beck. *Jour. Am. Med. Ass'n*, vol. 28, No. 1, 1902.

Beck presents a number of skiagraphs showing what the Roentgen rays will do in differentiating between osteomyelitis, osseous cyst, osteosarcoma, and other osseous lesions. He shows that the X-rays are of value in making an early diagnosis in cases of osteomyelitis, and that it will demonstrate every focus of the disease. Abscesses may be so well outlined that the technical steps of the operation may be definitely traced in advance. If but one focus shows, no other region of the bone need be attacked. The size and shape of sequestra can easily be made out and every position defined, and many times the rays will show one which it is impossible to feel with a probe. In arthritis the contours appear indented and in places veiled. Deposits are recognizable as light shadows, as they consist of translucent muric acid salts. In all tubercular lesions of the bones and joints the rays give definite information as to the seat and exact extent of the tubercular areas. Periosteal sarcomata are characterized by spiculated trabeculæ radiating from the surface. The soft variety shows absence of osseous tissue, except small fragments. A skiagraph of an osteosarcoma proper shows more osseous tissue than the former variety, but its outlines are very irregular. Beck considers the skiagraph expression of syphilis as characteristic.—*L. A. Weigel, Rochester.*

17. A New Contribution to the Treatment of Tuberculosis of Bones and Joints of Children after the Lannelongue Method. By M. Motta. *Archiv für Orth.*, No. 3, 1902.

Motta has for ten years followed the Lannelongue method with good and at times splendid results. He describes the technique. The injections should not be made directly into the affected part, but only into the immediate surrounding tissues. The periosteum is to be injected in case of bones and joints, and the periglandular issue in case of adenitis.

Differing from Lannelongue, he at once applies a compression dressing, and prefers to repeat the injection, which for the first time is not very strong. He uses a 10 per cent. solution, and carefully avoids letting the solution come in contact with the skin, in order to guard against an easily occurring necrosis. The injection, therefore, should always be made underneath the fascia, and, if rather superficial, the needle should be introduced in an oblique direction. The compression dressing makes the operation relatively painless, often not requiring narcotization.

Out of 24 cases of joints, he cured 14 with almost perfect mobility, 3 with 90°, 3 with 40 to 45°, and 4 with ankylosis. He states that the injections should not follow each other too quickly. The reports of the diseases he has cured are given in full, and include other affections. He warmly recommends the method to physicians, considering the fact that the cicatricial tissue can be differentiated from the affected tissue, and thereby later operations, if in certain cases they should become necessary, are made easier.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

18. The Spontaneous Correction of Bone Deformities. By Port. *Mün. Med. Woch.*, 48, 1902.

A case of severe rachitic curvature of the leg is reported, in which in the course of time a considerable amount of spontaneous correction occurred. According to the radiogram, the straightening took place as the result of a compensating deviation of the bone's long axis at the epiphyseal line, produced by unequal growth at this place and by the compensatory unequal activity of the periosteum. Port considers this observation as valuable evidence against the far-fetched conclusions which have been drawn from Wolff's observations on the transformation of bone, correct though they

be within certain limits. This pertains especially to the changes of the form of the bones in response to changes in function in adult individuals. He believes that these transformations can, for physiological reasons, take place only in children, and even in these are restricted to such bone particles as are destined by natural growth to disappear. In their place properly arranged trabeculæ are formed. In inflammatory conditions and fractures only can the bone of the adult become again active in this way, the periosteum being put back into a formative condition.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

19. **Osteomyelitis Albuminosa.** Dissertation, Freiburg, 1903. By Sinz.

Report and analysis of a case. The peculiar albuminous fluid is the only distinguishing characteristic feature of the disease, and the only one which serves to differentiate it from suppurative osteomyelitis as regards etiology, symptomatology, or, for that matter, pathological anatomy. He regards it simply as an anomaly in the course of acute infectious osteomyelitis, whose cause is as yet entirely hypothetical.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3

20. **Osteogenesis Imperfecta.** By Harbitz. *Norsk. Mag. F. Lagevidenskaben*, A. 63, N. 1, 5 L., 1902.

Collection of twenty-one cases from the literature with report of one original. Radiogram. The principal characteristics of the condition are given as shortness of the extremities with well-developed head and trunk. The cranial base is normally developed, but with brittle and osteoporotic bone nuclei. No premature synostosis. Incomplete development of the bone centres of head and face. Imperfect ossification especially marked in the long bones. These are extremely slender, thus leading to numerous fractures. These may be multiple in the same bone, and may occur ante- or post-partum. Microscopic examination shows a proliferation zone that is of proper form, but too small. The various bone thickenings are callus formations after fracture, and not swellings of rachitic or luetic character. The cause of the condition is entirely unknown. Chondrodystrophy and osteogenesis imperfecta are entirely distinct and, to a degree, opposite conditions. Osteogenesis imperfecta is preferred to achondroplasia as a name, because the French have been confusing the two forms under this title.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

21. **A Case of Osteogenesis Imperfecta.** Dissertation, Giessen, 1902. By Helwig.

Late investigation has shown that the so-called fœtal rachitis has nothing in common with true rachitis, and that it is, in fact, not to be regarded as an entity at all. Cases formerly described as fœtal rachitis should be classified either as chondrodystrophy or as osteogenesis imperfecta. The latter consists of an interference with bone formation, while the former is caused by imperfect cartilage growth and a premature cessation of endochondral ossification. A case is reported with X-ray and microscopic examination.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

22. **Trauma as Cause of "Locus Minoris Resistentiæ" in Bones and Joints.** Dissertation, Kiel, 1902. By Prahl.

The author attempts to show that in the production of the infectious diseases of bones and joints the presence in the body of the infectious material is not sufficient to account for the localization of the disease, but that there is necessarily some predisposing circumstance to which the inflammatory process owes its inception.

A case is presented which is believed to show the infection of a focus of diminished resisting power as the result of trauma through the medium of the circulation. This was afterward found to be a piece of bone which was torn loose.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

23. Lesions of the Tibial Tubercle occurring during Adolescence. By Robert B. Osgood, Boston. *B. M. & S. Jour.*, vol. cxlviii., No. 5.

The adolescent tibial tubercle, from its situation and mode of development, is susceptible to injuries, especially in athletic subjects. These lesions are usually caused by a violent contraction of the quadriceps extensor.

Fracture and complete avulsion of the tubercle are rare, cause loss of function, and are easily diagnosed, usually clinically and always by means of X-ray.

Avulsions of a small portion and partial separation of the tubercle are more common. They do not cause complete loss of function, but without treatment long-continued serious annoyance. The diagnosis should be made by a combination of the clinical and X-ray pictures; and, before the latter are accepted as evidence, both knees should be skiagraphed, and accurate technique observed.

24. Avulsion of the Tibial Tubercle. By Francis D. Donoghue. *B. M. & S. Jour.*, June 11, 1903.

The cases previously reported have been those of active, athletic boys between thirteen and sixteen. The author's case is that of a girl of thirteen, likewise muscular and athletic. While vaulting over a horse in a gymnasium, she fell, striking the cushion with her knee. There followed swelling and pain, especially noticeable on attempting to kneel. After five weeks she came under the writer's observation. There was swelling, stiffness, and some pain, especially in the region of the tibial tubercle. The patellæ were of the same elevation. The Roentgen rays showed plainly the true condition,—avulsion of the tibial tubercle. Under treatment by strapping the leg became almost perfect functionally.—*Abst. in Am. Medicine.*

25. Contribution to the Knowledge of Acute Bone Atrophy. By A. Exner. *Fortschritte auf dem Gebiete der Roentgenstrahlen*, Bd. VI. Heft 1.

So-called acute bone atrophy may take place in fractures, acute inflammations, gonorrhœa, lues, and numerous other diseases. There is a thinning of the cortex, and at the same time the spongy portion becomes wider meshed. The muscles do not necessarily atrophy with the bone atrophy. It may be very marked, even if the primary disease is not severe. Probably the cause is disturbance in the circulation. That property of the bone which entails the building up of new trabeculæ, according to Wolff's law, is disturbed. Physical experiments show a loss in the weight: chemically, there is no gross change in the composition.—*Abst. Archiv für Orth.*, Bd. I. Heft 1.

26. Acute Bone Atrophy following Inflammations and Injuries of the Extremities and its Clinical Appearance. By P. Sudeck. *Fortschr. a. d. Geb. d. Roentgenstrahlen*, Hamb., 1902, v. 277.

Acute phlegmons of the joints frequently result in long-continued functional disturbances, especially in the hands; and this may continue for months. In many cases complete restoration does not take place, and stiffness of the fingers and wrist is more or less permanent. In these cases the phlegmonous process is not in the fingers themselves, but localized in the wrist joint; and the change in the fingers is secondary. The condition is not due to prolonged immobilization, as there is a marked change in the bone structure itself, which may be accurately demonstrated by the Roentgen rays. Sudeck finds these changes in the bone very frequently after inflammatory processes of the soft parts. Even where there has been no involvement of the joints and tendon sheaths or suppuration of the finger joints, the characteristic bone changes are seldom absent. He gives the history of a series of cases in which the characteristic bone atrophy could be demonstrated, and included fractures into the joints,—sprains, contusions, crushing of joints, injury of soft parts, nerve injuries, and herpes zoster with neuritis. A review

of the cases shows that after traumatisms of every kind, as well as after prolonged inflammation (acute inflammation of large and small joints, osteomyelitis, tenosynovitis, and phlegmon of soft parts), a resorption of bone, demonstrable by the X-ray, may be shown. Nerve injuries may also be a factor. The injuries are, as a rule, not severe. It must be admitted that joint affections are more apt to predispose to bone atrophy than fractures, and that this atrophy occurs more frequently after inflammations than from simple traumatism. In acute inflammations of the larger joints, at least of the wrist, an acute atrophy of the whole hand skeleton is the rule; and this also occurs quite frequently after injuries. The disappearance of the normal bone structure is very marked, and shows in a surprisingly short time after the traumatism. The shortest time observed was four and a half weeks, and after eight or ten weeks it may reach a high degree. It thus differs from the well-known forms of bone atrophy due to senility and non-use. In the X-ray picture this bone atrophy may be observed in various forms. In the earlier stages there is an irregular spotted condition of the bone shadow. In the hand this spotted condition is first noticed in the spongy substance, then at the base of the phalanges and metacarpals, and finally in the carpal bones. At times the bone appears to be perforated in spots. The compact layer of bone is only affected at a later period. This condition may disappear as rapidly as it began, so that after some weeks nothing pathological can be detected. With this restoration of the normal, the functional disturbances also disappear, if the disease has not existed too long.

When the atrophy has existed for a long time, the X-ray plate shows the chronic form. The structure of the bone is still visible, but all of the lamellæ are much more delicate and thinner than normal: the bones appear translucent. The practised eye at once recognizes the significance of this pathological condition. In the soft parts, vasomotor disturbances are observed, and consist of cyanosis, with a subjective and objective coldness of the skin, an œdema.

The diagnosis is based upon the skiagraphic demonstration of the bone atrophy. Sudeck's conclusions are that he has been able to prove that, after inflammations and injuries of the extremities, in addition to muscular atrophy and trophic disturbances of the skin, an acute bone atrophy may also occur, which, in the light of our present knowledge, must be considered as a trophic neurosis, and that, furthermore, this bone atrophy may produce very marked and persistent disturbances of function. The disturbance of function is only indirectly connected with the original trouble, so that under certain circumstances the muscle and bone atrophy may acquire the characteristics of an independent disease. Furthermore, it is important, not only for diagnosis or differential diagnosis, but also for treatment, to give particular attention to the above-described X-ray findings. It is frequently desirable to make X-ray plates of both the affected and unaffected extremity, to appreciate, by comparison, the character of the bone changes.—*L. A. Weigel, Rochester.*

27. On Habitual Luxation. By Dr. Walter Wendel, Marburg. *Archiv für Orth.*, Bd. I. Heft 1.

Wendel considers the etiology of habitual luxation as given by different authors—Joessel, Roser, Franke, and others—from autopsies and operations. He discusses several cases of shoulder luxation that were observed in the Marburg clinic. He describes Heusner's operation of deepening the sigmoid fossa, also the operation of Bloch for habitual luxation of the elbow, and describes three cases operated in the Marburg clinic. He discusses the etiology of the condition, the changes in the bone due to disease of cord, such as tabes and syringomyelia. He divides the cases into traumatic and pathological, and regards the traumatic as operable, while the pathological ones are disease symptoms, and only rarely can be operated. Voluntary luxation is a curiosity, while the habitual is a disease. The article has 3 cuts and a bibliography of 39 titles.—*D. Townsend, Boston.*

CONGENITAL DISLOCATION OF THE HIP.

28. Results of Bloodless Reduction of Congenital Hip. By M. E. Kirmisson. *Revue d'Orthopédie*, May, 1903.

When Lorenz first brought forward the bloodless reduction of congenital hip, he considered it a radical operation for cure of the deformity, not a palliative form of treatment.

The following year, before the Imperial Medical Society of Vienna, he was obliged to acknowledge that his first statements claimed too much, the X-ray showing in many cases that there was a secondary forward and upward dislocation following reposition.

In 1899 Lorenz made a statement of his results. In 22 cases reposition was impossible. In 15 cases there followed backward dislocation. In studying from the X-ray 135 of his early cases, Lorenz found 56 doubtful or incomplete results, and 79 satisfactory cases from an anatomical point of view.

Hoffa believes that the bloodless method rarely gives permanent reduction. Often, however, there is improvement by this method of treatment, although the result is not a complete reduction. The head of the femur finding a firm point of pressure against the pelvis, a good functional result is obtained.

Peterson published the results of Schede at the Bonn clinic, and concludes that nothing is rarer than a complete reposition. In 161 cases, 70 being double, there were but 8 satisfactory reductions among the single cases, and but two among the double congenital dislocations. As a rule, a transposition is the result.

Kummel, of Hamburg, obtained good functional results by transposition; but otherwise, in 66 congenital dislocations on 50 patients, reposition was obtained in but 11 cases.

In 1900 Broca reported but two real reductions, while Rédard reported 12 in 32 cases.

Joachimsthal obtained 17 good results in 23 cases.

Burghard, however, obtained but one positive reduction in 20 cases.

Nové Josseraud, of Lyons, reports 25 reductions, 37 transpositions, 2 fractures, 3 relapses, and 2 immovable heads.

Finally, Müller, of Stuttgart, in 40 single cases obtained 28 cures,—*i.e.*, 70 per cent.,—and five complete cures in 21 double cases.

The absolute value of the bloodless treatment is not as yet statistically fixed, and Kirmisson urges that reports of results be made in order to determine the absolute value of bloodless reposition. In his service at the Trousseau Hospital since 1898 (*i.e.*, in the last five years), of 27 unilateral cases, 10 were either impossible or for some reason other treatment was tried, so that 17 cases were operated by the bloodless method, with the following results: 5, no shortening; 2, 1 cm. shortening; 6, with 1 cm. shortening; the others from 2 to 4 cm. shortening. Functional results are good in the majority of cases. Of 27 bilateral 21 were treated: 3, excellent results; 11, good results; only 3 relapses of one side, and but 1 relapse of both sides. There is a detail of cases and of operative procedure.

Kirmisson favors the selection of treatment for each case in congenital traumatic or pathological luxation, choosing the least violent that the case allows rather than to succeed by force at the risk of doing much harm.—*Robert Soutter, Boston.*

29. Present Status of Congenital Dislocation of Hip. By V. P. Gibney. *Am. Med.*, May 30, 1903.

Conclusions:—

1. Do not rest content in a case of hip lameness in a young child until you have made a thorough examination and obtained a full history.

2. Diagnosis being established, aim to get a reduction before the sixth or seventh year. It is fatal to postpone operation.

3. In cases beyond the age limit, ascertain the exact position of the head, its shape, and relations by an X-ray.

4. Do not make long attempts at reduction in patients over ten years.

5. Bear in mind the dangers which Lorenz himself has pointed out: too extensive laceration of soft parts; paralysis, which may or may not yield in time to treatment; fracture of the femur or of the pelvic bone; the rupture of arteries, sometimes the femoral.—*R. Soutter, Boston.*

30. Subluxations in Congenital Hip Dislocations. By Walther. *Muen. Med Woch.*, 1903, No. 14.

Reports nine cases of incomplete congenital luxations with tracings of radiograms. Emphasizes Lange's advice to make radiograms in external rotation as well as internal rotation of the thigh. In this way one may avoid overlooking some cases of subluxation. Antagonizes Lorenz's advice not to attempt the reduction until children are of cleanly habit, as by so doing the attempts at walking may convert some subluxations into complete luxations, making conditions more difficult.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

31. Curing Congenital Hip Joint Luxations by Bloodless Reposition and the Anatomical Procedures. By E. Müller, Stuttgart.

a. Left hip of a girl aged four years, replaced successfully two years before. The healing was a perfect one as regards function. The muscles showed perfectly regular proportions. The joint itself was not to be distinguished from a normal joint. The socket is regular and even smooth, covering about two-fifths of a circle. The roof consists almost entirely of cartilage, the head being closely opposed. The neck appears somewhat more clumsy. The capsule is tightly stretched over the head, and the ligamentum teres is well preserved.

b. Discussion of another case.—Here the head does not touch the socket in its whole circumference, because the curves do not conform to the shape of the head. The socket is flat, like a dish, while the head is irregular. The capsule shows no more wrinkling, and it evidently shrinks up fairly quickly, but will not be firm enough to hold the head in motion for three or four months.

Undoubtedly, the limb influences the formation of the joint: both play their parts. Müller has cured twenty-eight out of forty unilateral dislocations with perfect success. He always applies the dressing in extreme abduction external rotation, and with the knee perfectly stretched. Only in this way can the head be fixed.

Of the double cases he had five out of twenty-one perfect cures. He reproaches himself with having begun treatment of children who were too old, and with having made repositions of both legs on the same day, thus losing the opportunity of making use of walking. Nowadays he refuses to make repositions on children over five years old in cases of double dislocation. He has had perfect results in cases of one-sided dislocations in children of eight.

To prepare by pulling he thinks unnecessary, except in cases of older children. The after treatment of babies is entirely unnecessary.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

32. An Apparatus for the After Treatment of Congenital Luxation of the Hip. *Deutsch. Med. Woch.*, February 19, 1903.

L. Heusner demonstrates a new apparatus which he has found valuable in maintaining the legs and feet in proper position after the reduction of congenital hip dislocation by Lorenz's method. It consists of a leather corset for the trunk and pelvis, a short leather piece for thigh connected

to body-piece with springs, which prevent immoderate flexion, and keep the thighs spread out. Spinal springs extend downward over knee to foot. They tend to keep the feet and legs inverted. It is especially valuable in bilateral cases.—*H. A. Wilson, Am. Med.*

33. **A Note on Some Radiographs illustrating Congenital Dislocation of the Hip.** By Morgan. *British Medical Journal*, April 11, 1903.

Morgan illustrates his statement that radiography should assist the operator in the selection of suitable cases by a series of plates. Radiography is of value in determining the character of the reduction, and enables one to follow the case closely during the long period of after treatment. False position of the limbs during the exposure may lead to erroneous interpretation of the radiogram.—*L. A. Weigel, Rochester.*

34. **Congenital Luxation of the Hip.** By Veau & Cathala. *Archives de Méd. des Enfants*, No. 1, 1902.

Anatomical examination of the right hip of a child which died one and one-half months after bloodless reduction. Concludes that true reduction is possible from anatomical standpoint, and that abduction and outward rotation is the best position in which to fix.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

35. **Congenital Fissure of the Neck of the Femur.** By Helbing. *Deutsch. Med. Woch.*, No. 15, 1902.

Four cases reported with radiograms. They were incomplete fissures at right angles to the axis of the neck, accompanied by diminution of the angle between neck and shaft, elevation of the trochanter and shortening of the femoral neck. Clinical picture similar to congenital luxation. No question of trauma or rachitis. Therapeutically suggests manual osteoclasis of femoral neck.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

36. **Interpretations of Radiograms in Congenital Hip Luxations.** By Gourdon. *Rev. Mens. de Gynecol.*, No. 4, 1902.

Draws attention to the discrepancy which may exist between the clinical characters and the appearance of the radiogram. Explains this by assuming that the hold of femur on pelvis is maintained in early life, not by a bony socket, but by tissue which is easily penetrated by the X-rays. He warns not to judge the result of reduction manœuvres by radiogram alone.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

37. **Gwilym G. Davis.** *Am. Med.*, May 30, 1903.

Describes the methods of Paci, Heusner, and Lorenz in treatment of congenital dislocation of the hip.—*R. Soutter, Boston.*

HIP DISEASES.

38. **Etiology of Coxa Vara.** By Haedke. *Deutsch. Zeitschr. für Chir.*, Bd. 66, Heft 2.

Histological examination of a specimen of coxa vara obtained by resection from a seventeen-year-old patient. Found a condition similar to rickets, both macro- and microscopically. Concludes that coxa vara may develop at the age of puberty consequent upon the so-called late rickets, although the "juvenile osteomalacia" of Kocher is probably the explanation of the greater number.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

39. Coxa Vara as a Deformity caused by Weight. By Blum. *Langenbeck's Archiv*, 69th v. o3, N. 4.

A boy nine years old, who four years previously had had tubercular coxitis, was brought to the Vienna public hospital because his mother thought that his left leg was some 4 cm. longer than the right.

The examination had the following result. There was no lengthening of the left leg, but a shortening of the right leg, the trochanter of which was elevated. The cause of this was a right-sided coxa vara, brought on undoubtedly by a limited use of the left and an excessive use of the right leg. From this observation, and from the preparations of the Vienna collection, the author discusses the classification and genesis of the deformity. He concludes that in many cases of atrophy of one extremity, no matter how caused, there forms a coxa vara of the other side. This is to be explained simply by the over-weighting of the sound extremity.

It is of practical importance, because here the important antecedent symptom of Hofmeister—namely, the muscular atrophy on the coxa vara side—is wanting.

Coxa vara is a statical deformity. The influence of the weight of the trunk is to be demonstrated in many cases, while other affections, which usually are considered as causative, exert only a predisposing influence.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

40. Essay on the Problem of Coxa Vara. Discussion at Lyon, 1903. By Yvemantt.

A review of the anatomy of coxa vara in its various phases, following the essays of Jaboulay and Piqué. He limits the term "coxa vara" to cases which come on during the growing period, and are caused by trophical disturbances. An outline of the French literature on the subject is added.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

41. Fractures of the Femoral Neck in Childhood and Youth. By Hoffa. pp. 529.

Since the introduction of the radiographic method, the number of reports of this condition has been greatly augmented. In addition to fifty-three cases previously collected by Gerstle (Inaug. Diss. Würzburg, 1899), twenty-five cases are collected from the literature, and given in full. Hoffa adds the reports of eleven cases of his own.

Analysis of all the reported cases shows the greatest number to have occurred in the ages of ten to fifteen years. By far the greater number of cases are to be considered as epiphyseal separations. Of the eighty-seven reported cases, only four are held to be fractures of the neck. Of these, the greater number are incomplete breaks.

Etiologically, the cases are divided into two groups. The first are those occurring in previously healthy children. The second comprises patients in whom there had existed some abnormity of the femoral neck, chiefly coxa vara. This is, therefore, regarded as of etiological importance in the production of this lesion. Frequently the symptoms are so vague, and so little disabling, that the diagnosis is not correctly made. Later in their course, these cases are looked upon as hip disease or as static coxa vara.

Early recognition of these cases must be insisted upon. Elevation of the trochanter, shortening, shortened radius of rotation of the trochanter, crepitation, and possibly sugillation in the groin, are the symptoms to be depended upon. The slight character of the disability must not be allowed to confuse.

Later, tuberculous disease and static coxa vara must be excluded by the X-ray and by the absence of muscle spasm and atrophy of high degree.

Recognized in the beginning, these cases should be treated as fractures. The necessity of preventing yielding of the femoral neck by the wearing of apparatus for at least a year afterward is emphasized. Seen late and after

considerable deformity has occurred, resection or oblique subtrochanteric osteotomy must be considered.—*A. H. Freiberg, Cincinnati.*

KNEE.

42. Luxation of the Semilunar Cartilages of the Knee Joint. By Ferd. Schultze-Dinsberg. *Archiv für Orth.*, Bd. I. Heft 2, 1903.

A review of cases of loose semilunar cartilages. The present report is based on thirty-three cases confirmed by operation, two of which are the author's own.

In the etiology he finds it chiefly in males, in youth, and always following trauma. In twenty-five it was displaced inwards, and in eight outwards. The symptoms are sudden pain after an accident, and a crushing noise. The patient feels something slip in the knee joint. It is characteristic that the joint cannot be extended. He distinguishes old cases from the new. In the new one finds effusion and the joint partly bent. There is an elastic and tender swelling next to the patella. After the swelling of the joint has gone down, the cartilage may be palpated, best when the knee is bent. In old cases there are recurrent attacks of sudden pain following motion, although the pain may in some cases remain permanent.

The treatment may be conservative and operative. Conservative treatment is advised when the signs are not marked and the diagnosis not clear. But in all cases where the displaced cartilage can be demonstrated operation is advised. The operation may be removal or stitching the cartilage in place. The prognosis is for an excellent result.—*Henry Feiss, Cleveland.*

43. Knee-joint Tuberculosis: Expectant Treatment or Operation. By Professor König.

A report in detail of a case of tuberculosis of the knee joint in which an excision was done. A discussion of operative *versus* conservative treatment.

The writer figures on two and a half to three years as the time necessary for cure, if conservative treatment is carried out. We may hope for a little motion, but the treatment is long and expensive; and in the end we may have to resect or amputate, after all. If we operate to remove the disease, with extirpation of the process in or about the capsule, as well as upon the joint facets, we get a stiff leg, which may be shortened; but we can be practically sure of quick result, and the patient soon becomes used to the alteration in walking.

The writer explains the great number of amputations in his clinic as due to the fact that conservative treatment had been used, and that resection for tuberculous joints had scarcely ever been done.—*Henry Feiss, Cleveland.*

44. Growth and Structure of the Lower Femur and Upper Tibial Epiphysis. By Ludloff. *Bruns. Contrib.*, 1903, vol. 38, No. 1.

Normal knee joints of living models from one to eighty years have been studied by means of the X-rays.

Both lateral and antero-posterior views have been taken. By means of these Ludloff proves that some appearances ordinarily considered as pathological—*e.g.*, protuberances on the condyle between two and four years, and the so-called dark spot on the epiphysis—are quite normal.

The following summary is given:—

1. The epiphyseal lines of the lower end of the femur and the upper end of the tibia remain till the age of fifteen. From two and one-half to eight years a very marked formation of bone is noticeable at these points. From seven to fifteen years the tubercle of the tibia develops very rapidly.

2. The middle of the condyles grows more rapidly from two to three and one-half years, the lateral parts in the fourth year, and after that an even growth of both parts.

3. The middle of the condyles appears larger and has less thick spongy bone than the lateral parts. These show stronger longitudinal trabeculæ.
4. There is a space in front in which no vertical structure was observed.
5. During and after the third year this vertical structure becomes noticeable in the lower femur and upper tibial diaphysis.
6. When both condyles have become distinguishable bones, vertical and oblique trabeculæ develop within the intercondyloid notch.
7. During and after the twenty-fifth year the first appearances of atrophy are seen in the femoral epiphysis.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

45. Habitual Luxation of the Patella (p. 452). By Hannover Bade. *Zeitschr. für Orth. Chir.*, Stuttgart, 1903, Bd. XI. Heft 3.

Four cases are reported, three being of traumatic origin and one congenital. From the study of these cases as well as those reported in the literature, the author endeavors to draw conclusions regarding etiology and pathology of habitual dislocation of the patella as well as the symptomatology and treatment.

Regarding the etiology he finds the study of the literature shows decided influence of heredity as regards the disposition to luxation, resembling in this way congenital luxation of the hip. It is the author's opinion that habitual luxation of the patella is never congenital, but that a traumatic factor always exists in conjunction with hereditary predisposition. Congenital luxations, not habitual, are placed by him in a separate class.

The conditions which constitute the hereditary predisposition he considers to be delicate structure of the whole knee joint; great mobility of the patella, produced by laxity of ligaments and muscles, and especially the vastus internus.

Various combinations of these anatomical peculiarities may cause a patellar luxation to become habitual, which was produced by trauma in the first instance. The traumatic element may be a direct external force or, on the other hand, an indirect one, exerting itself upon the knee joint through a particular position of the body. These two may act in conjunction. Direct force seems to preponderate in the production of the original dislocation. The reverse is true regarding the subsequent slippings of the patella.

The symptomatology is carefully discussed, but without presentation of new facts. The same may be said of the treatment. A full bibliography is appended.—*A. H. Freiberg, Cincinnati.*

46. Curvature of the Leg after Knee-joint Resections in Early Life. By Hofmeister. *Bruns. Contrib.*, vol. 37, Nos. 1 & 2.

The disadvantage of resection and arthrectomy of the knee joint in early life are *shortening* and curvature of the leg. The author discusses 125 cases, which could be examined after operation, covering a period of seventeen years. These were:—

18 times (16.8%), absolutely straight legs.
29 times (27.1%), straight to an angle of 165°.
30 times (28%), moderate curving (160°–140°).
48 times (44.9%), serious contractions of flexion (130° and less).

The review of these cases shows that, the younger the children, the more likely were the operations to be followed by secondary contractures. There were no contractures to be observed in children over fourteen.

Three different groups can be distinguished:—

1. That in which the contracture comes on soon after operation, and grows worse rapidly.
2. That in which the contraction begins very slowly, and extends over many years.
3. That which is caused by occasional trauma.

He has found each of these groups many times.

As to the question of etiology the author makes the following distinc-

tions. In the first year there must be a *locus minoris resistentiæ* where a bending might take place. It is to be seen in a pathological softening of the bone in consequence of the tubercular process and also in the physiological weakness in the neighborhood of the epiphyseal lines.

Moreover, the forces at work—namely, the weight of the body and the pull of the flexors—act on these very places.

The author points out the fact that the vertex of the bending almost never corresponds with the epiphyseal line of the tibia, because the upper epiphysis of the tibia has to stand scarcely any pull of the flexors. In this way, even those cases in which contractures occurred without the factor of body weight can be explained.

By means of X-rays the contour should be carefully studied, in order that the bone may be attacked at the point of most extreme bending. Hofmeister advises the division of the flexors and their transplantation into the extensors. This rule holds good for every knee resection before the eighth year.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

47. **A New Method of Correcting Flexion Deformity at the Knee Joint.** By Royal Whitman. *Am. Jour. Med. Sci.*, May, 1903.

Royal Whitman describes this method, which consists of manual manipulation in preference to the use of mechanic appliances. The patient is placed prone upon a flat table, the operator then holds with one hand the head of the tibia firmly against the table, and with the ulnar border of the other begins forcible massage upon the contracted hamstrings, after the method employed (by Lorenz) in overcoming the resistance of the adductors in the operation of reduction of congenital dislocation of the hip. It is suitable to those cases where osteotomy is deemed unnecessary or inexpedient.—*H. A. Wilson, Am. Med.*

SHOULDER.

48. **On the Freeing of the Contractions of the Shoulder Joint.** By Professor Dr. A. Ritschl, Freiburg.—*Archiv für Orth.*, Bd. I. Heft 2.

The usual method of overcoming the contractions of the shoulder joint is partly manual and partly mechanical; and, in the mechanical part, Dr. Ritschl recommends, of the many kinds of apparatus, the one he and Dr. Beely constructed. He considers both the manual and the mechanical methods necessary, but describes also the technique of a purely manual form of reduction, where one pushes the scapula backward with one hand and with the other raises the arm laterally. This has the advantage that one does not have to think of the horizontally fixed arm, and can concentrate his attention more fully on the movement of the scapula. This method can be used in the horizontal as well as the recumbent position.—*D. Townsend, Boston.*

49. **Acquired Elevation of the Scapula.** By Bender. *Muen. Med. Woch.*, No. 9, 1902.

The author reports a case in a girl of twelve years. Bender looks upon this case as acquired and of rachitic origin. He agrees in this with Kölliker, who first described it in 1898. Kölliker considers increased curvature of the body, hook formation of the superior angle, enlargement of the coracoid process, and twisting forward of the glenoid fossa as characteristic of the rachitic deformity of the scapula. The elevation is ascribed to the hook-shaped upper angle clinging to the thorax, the enlarged coracoid applying itself to the clavicle from below.

These characteristics, as well as the absence of other malformations, are

held by Bender as differentiating the condition from the congenital variety. The condition is very rare. Gross has described one case in addition to those of Kölliker and Bender. Photograms and radiograms.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

50. Congenital Elevation of the Scapula. By Sick. *Deutsch. Zeit. für Chir.*, Bd. 67.

Sick has observed two cases of this condition which are calculated to throw light on its causation. The first case is a bilateral one. Muscle anomalies were wanting in both cases, but deformity of the bones themselves, combined with incomplete closure of the vertebral canal, was present in both of them. In the bilateral case there was an hereditary element, while the other had the local hypertrichosis so often associated with spina bifida occulta. There appeared no occasion for operative interference in either case. The usefulness of the arms was sufficiently improved by gymnastics.

In the course of a critical examination of the fifty-seven reported cases of congenital elevation of the scapula, Sick finds that about two-thirds of them may be considered due to arrest of development. He leaves undecided the explanation of the remaining one-third, although he is inclined to consider them also as instances of arrested development, though of lesser degree. He holds the trapezius defects, used by Kausch in his explanation, as merely faculative accompaniments of the arrests of development in the spine and scapula, respectively.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

51. On the Etiology of Double Congenital Elevation of the Scapulæ. By H. Mohr. *Org. für Orth. Chir.*, vol. ii., No. 2.

Heretofore only five cases of double elevation of the scapulæ have been observed. In the case of a twenty-two-year-old working-woman the deformity was congenital, but is said to have grown worse. Vertebral curvatures came on later. From an early age she liked to rest her arms upon her back. Her head is bent forward, the shoulder line in the neck region has vanished, and the neck itself is shortened and broadened. The scapulæ, especially the left one, are of abnormal height. An upward motion of the arms is soon followed by a corresponding motion of the scapulæ.

As to the question of etiology, the author thinks the symptoms of the case are explained by the Sprengel theory of "intra-uterine pressure." Muscular atrophy and developmental changes in the scapulæ are to be considered secondary symptoms. The lordosis which has been observed seems to compensate the forward bending of the head.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

FOOT.

52. The Importance of the Tibialis Posticus and the Plantar Muscles in Flat Foot. By Nicoladoni. *Deutsch. Zeit. für Chir.*, Bd. 67.

Nicoladoni was one of the first to express belief in the importance of the tibialis posticus in maintaining the arch of the foot, on account of the way it spreads fanlike over the astragular head into the tarsus. From this he deduced the procedure of grafting half of the Achillis tendo upon the posticus. Observations upon paralysis cases and other considerations also have led him to modify his opinion to the extent of believing the sole muscles to be at least as important in this regard as the posticus. He finds that permanent loss of the tibialis posticus is not of necessity followed by flat foot, while the reverse is true of the sole muscles. This greatly diminishes the importance of the tibialis posticus in etiology, but also the treatment of flat foot. More rational than strengthening the posticus by a graft would therefore be

the temporary exclusion of the triceps suræ, which is the antagonist of the sole muscles. For severe cases he proposes open tenotomy of the tendo Achillis, with temporary displacement of the proximal end under the crural fascia to prevent premature union. When, as the result of function, pes calcaneus has developed, the reunion of the tendo Achillis may be undertaken.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

53. On the Mechanism of Flat Foot. By S. Petersen. *Von Langenbeck's Records*, vol. 69, Nos. 1 & 2.

There are four different changes in flat-foot joints in consequence of weight.

(1) A bending in the upper ankle joint between the leg and the ankle bone, whereby the head of the astragulus is lowered.

(2) A pronation in the lower ankle joint between the astragulus and the os calcis, whereby the inner border of the foot becomes lowered.

(3) A yielding within Chopart's joint, which brings about a flattening of the whole foot vault and puts an intense strain upon the calcaneal, navicular, and plantar ligaments.

(4) An abduction at Chopart's joint, which is brought about by different motions at Chopart's joint, which causes a flattening of the inner border of the foot.

Flat foot represents a pathological extreme beyond these four physiological motions and a fixation of this position that is a subluxation. It is spoken of, therefore, as a pes flexus, pronatus, reflexus, or abductus. These names at once indicate the clinical symptoms and especially the points of pain, namely: external malleolus, pressure on the calcaneus; centre of the sole, pulling on the calcaneal, navicular, and plantar ligaments; under surface of the heel, pulling of the tendons and muscular attachments.

Flat foot is entirely a weight deformity, caused by a disproportion between the resistance of the supporting structures and the amount of weight working upon it. Rickets and puberty are predisposing factors.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

54. Flat-foot Support made of Celluloid and Steel Wire. *Muen. Med. Woch.*, February 17, 1903.

The pains of flat feet can be found in various portions of the foot, and do not in the least correspond to the degree of pes planus. Sometimes the greatest pains are found in cases preserving a good arch. An important diagnostic sign is that the pain is complained of only during walking and standing, and ceases as soon as the patient rests. The cause of the pain lies in the small footbones pressing against each other, and in an excessive pulling of some of the ligaments. The diagnosis of flat foot is, however, only proved by the results of rationally conducted treatment, which must consist of the production of an arch as high as possible. The insole must be made accurately from a plaster of Paris cast, and even then fully 20 per cent. of the soles require additional correction. In cases of valgus positions of the foot the insole must form an oblique plane, and must have a lateral edge to prevent a gliding off of the foot. As best material, he recommends a solution of celluloid and acetone over Längsgurte. Wires are introduced to strengthen the tension of the arch. F. Lange reports very good results. Of 400 patients thus afflicted, only 8 failed to improve, and a number were cured. For good results, however, it is necessary for the patient to be under daily supervision for eight days, for the physician to make the cast and model himself, sometimes also the insole, and for the patient to wear the insole for several years. [E. L.]—*H. A. Wilson, Am. Med.*

55. Some New Apparatus for the Forcible Correction of Deformed Feet. By Vogel. p. 508, *Zeitschr. für Orth. Chir.*, xi. 3.

In place of the Lorenz ostoclast three instruments are designed for the correction of pes varus, planus, and excavatus, respectively.

For the first two the apparatus consists of a long handle terminating in a pad of suitable shape, and a curved arm terminating in a padded crutch. The latter is made to approximate the former by means of a screw on the shaft of the handle. The foot is then wrenched into shape, the pad on the end of the handle acting as a fulcrum.

For cavus the apparatus resembles closely in principle the apparatus of Rédard. The heel and ball of the foot resting on pads, a third pad is made to press upon the dorsum by means of a compound lever acting from below. The illustrations are self-explanatory.—*A. H. Freiburg, Cincinnati.*

RICKETS.

56. The Cause of the Disappearance of Knock-knee when the Knee is flexed. By Kirmisson. *Revue d'Orthopédie,* March, 1903.

That this occurs no one doubts, but the cause is variously accounted for. After quoting other authors, Kirmisson explains the phenomenon by the fact that the internal condyle of the femur is lower than the external. In knock-knee, due to enlargement of or lowering of the internal condyle of the femur, adduction of the tibia takes place with flexion of the knee. Kirmisson demonstrates this very simply and clearly by a piece of paper.—*Robert Soutter, Boston.*

57. Prolonged Evolution of Knock-knee. By L. Ombredaune. *Rev. d'Orth.,* March, 1903.

Dr. Ombredaune considers most carefully and in extreme detail the development of knock-knee with minute description of cases and the method of treatment, especially the comparison of McEwen's and Ogston's operations.

Ombredaune favors Ogston's operation in severe cases, for in osteotomy of the internal condyle the line of the bone is preserved.

Knock-knee may increase after a person has attained his growth. In extreme cases McEwen's operation is less advantageous, and Ogston's more and more indicated as the deformity is increased.—*Robert Soutter, Boston.*

TORTICOLLIS.

58. "Congenital" Wryneck. *Zeitschr. für Orth. Chir.,* 1903, xi. 416.

H. Maass has studied forty cases of wryneck in the new-born from the standpoint of their etiology. Twenty-three of these were breech presentations, five were forceps deliveries. He considers the cause of this condition to lie in pathologic changes arising in the sternomastoid, as the result of birth trauma. A few of the cases may be due to infectious myositis in the course of an intra-uterine injury, but this is relatively seldom. [E. L.]—*H. A. Wilson, Am. Med.*

PARALYSIS.

59. Treatment of Infantile Spastic Paralysis. Liverpool *Med. Chir. Jour.,* October, 1902.

R. Jones believes a large proportion of children suffering from severe forms of this affection may be transformed into useful members of the community, and enabled to walk with little deformity, many requiring only the aid to be derived from one or two sticks. Active treatment may be needed for nearly two years. Hemiplegia usually affects the arm much

more than the leg, and the treatment is less promising than in diplegic cases. If the patient can do more with the hand than at some previous time, success of treatment is assured. When any voluntary relaxation of spasm exists apart from associated movement on the opposite side, treatment is emphatically indicated. Since the dominant deformity is pronation and carpal flexion, the elbow must be fixed supine, and the wrist and fingers fully extended. Prolonged fixation of spastic muscles in a position opposed to their contraction lessens the severity of the spasm. Extension may be discarded in twelve months. If success cannot be predicted at this stage, tenotomy or tendon transplantation should be performed. After operation, over-extension should be practised for a few weeks, and, in order to prevent adhesions, the wrist should be moved about. Movements from simple to complex should be taught. Division of the tendo Achillis controls spasm not only in the calf muscles, but influences spasm elsewhere. In spastic paraplegia the splint should keep the limb in marked abduction. If there are any obstacles to easy extension of the knees, the hamstrings must be divided by open incisions on each side of the popliteal space. The patient should be kept on the abduction frame at least three months. Movements must then be sedulously practised, and finally the little patient can be taught to walk. Much depends on the nurse. The mental condition improves with the physical. Complete recovery in spastic paraplegia is, of course, impossible.—*H. A. Wilson, Am. Med.*

60. Poliencephalomyelitis and Allied Conditions. By E. W. Taylor. *B. M. & S. Jour.*, June 11-18, 1903.

Taylor believes that a large group of affections of the central nervous system exists, provisionally to be regarded as inflammatory, in which may be included encephalitis, poliencephalitis (superior and inferior), poliencephalomyelitis, poliomyelitis, encephalomyelitis, and, with reservations, Landry's paralysis, and possibly myasthenia gravis, and certain peripheral nerve infections. These should be regarded as essentially identical, differing only in symptomatic expression. The evidence for this lies in the simultaneous involvement in individual cases of various portions of the nervous system, a notable example of which is given in poliencephalomyelitis.

We should gain in our understanding of these and other affections if we adopted a classification based on pathologic alterations and on etiology, whenever possible, rather than on clinical symptoms determined by anatomic subdivisions. Admitting a somewhat definite pathologic alteration of the nature of inflammation as a fairly constant factor, we may assume the existence of a common exciting, probably toxic, cause. The nature of this cause is practically unknown, its manifestations are not always uniform, and our final understanding of the distribution and prognosis of these affections must depend, first, upon our knowledge of these exciting causes, and, second, upon the nature of individual susceptibility and resistance. [H. M.]—*Abst. Am. Med.*

TENDONS AND MUSCLES.

61. Osteal Tendon Transplantation. By J. Wolff. *Deutsch. Med. Woch.*, No. 18, 1902.

This article antagonizes the too optimistic contributions on tendon transplantation of late years, and emphasizes the fact that no absolute gain of power is achieved thereby, but only a change in its distribution. Less possible still is it to acquire an absolute increase in power when the muscle which is to supply it is itself paretic. For this reason he holds it better to simply improve the position by shortening tendons or by displacing such as are shortened without considering the functional activity of the respective muscles. In place of the periosteal method of Lange, he proposes

the fixation of the tendon in a groove cut in the bone. He reports four cases of paralytic extremities thus successfully operated upon.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

62. Histological Investigations on the Repair of Tendon Wounds and Defects. By Seggel. *Beitr. z. klin. Chir.*, Bd. 37, Heft 1–2.

Exhaustive study of the repair of tendon wounds, including tenotomy, tendon suture, and all the methods of tendon plastics. According to this the development of a new tendon occurs by the organization of the blood poured out from the sheath and the divided tendon. This fills the whole tendon sheath. On the tenth day the inner layers of the tendon sheath consist of long, slender, spindle cells, with marked fibrillation. By the thirtieth day the tendon regeneration is already far advanced, compact tendon bundles growing distally push the loose granulation tissue ahead. By the thirty-eighth day the regeneration extends to the whole cross section. By the fiftieth day the climax of organization is reached, the tissue remaining either unchanged or becoming of looser texture. Seggel concludes that the tendons possess a very marked power of regeneration. This begins, however, only secondarily after the lapse of eight to ten days, and remains for a long time in one state.

The practical application of these investigations is as follows: Long fixation is necessary. Not even before the fortieth day is the use of the tendon rational. In view of the great rôle played by the tendon sheath in the process of repair, its integrity is of importance. However, the sheath has nothing to do with the actual regeneration. For this reason real regeneration may be expected in osteal and periosteal tendon transplantation. Functional use does not seem to make any great difference in the healing process, nor does this seem to depend upon the tension. The same may be said of foreign bodies. The primary *quality* of the regeneration is not determined by these external conditions, but the *quantity* of material produced is. These things must be carefully considered in doing operative work upon tendons for this reason.—*Abst. Zeit. für Orth. Chir.*, xi. 3.

63. On the Technique of Lengthening of Tendons by Tendon Transplantation. By C. Springer. 6 illustrations. *Archiv für Orth.*, Bd. I. Heft 1.

Springer uses the Z method of Beyer in pure equinus cases, and such as are complicated with valgus or varus. His method consists in making a subcutaneous cross-cut with a tenotome half through the tendo Achillis (for valgus position on the inner side, and for varus the outer side) above, and a sufficient distance below on the opposite side, and then by a strong dorsal flexion of the foot a subcutaneous separation of the longitudinal fibres takes place, accompanied by an evident jerk. This method Springer has used as well for torticollis, Duprey's contraction, and joint contractions. After the Z incision is made, the peronei are sewed to the tendo Achillis. He favors the Z method of Beyer because it is easily performed, it leaves a suitable surface wound for the sewing on of the peronei, the whole of the material is used for the lengthening, the whole tendon when lengthened represents half of the original tendon, the portion not lengthened is let alone, and, when healed, the tendon is one-sixth stronger than if done by Priolean's method.—*David Townsend, Boston.*

64. The Elasticity of Muscles and its Importance in Surgery. By Tillman. *Von Langenbeck's Archiv*, vol. 69, Nos. 1 & 2.

The position of equilibrium in the joints depends upon (1) the manner in which those muscles which are in a perpetual state of tension keep the balance, and (2) upon gravity. The elasticity of the muscle puts it always "on the stretch," even when the joint is at rest. This accounts for the fact that the voluntary contractions, in spite of their suddenness, take place gently and gradually, and not jerkily.

Tillman examined the results of Mosso's experiments with a myotonometer by experimenting himself. In agreement with Mosso he found that the muscle, whether passively extended or put on the stretch by the tension of its antagonistic groups, remained in a state of "after extension," while the antagonistic muscles remained in contraction until another active contraction equalized the differences.

Other experiments on the finger muscles of a living subject showed that a disturbance of the "balance position" for a short time (*i.e.*, perhaps twenty seconds) had no positive effect, while after a longer interference the finger had not come back to its normal position even after six minutes. This not only depends upon the "after extension," but also upon the shortening of the antagonizing muscles, there being a residuary shortening, so that the position of equilibrium is attained in less time if the stretching cord has been injured.

The difference of Triepel's results seems to be explained by the fact that the latter experimented on the muscles of an amputated extremity.

The contractibility of muscles under normal conditions seems to show that lasting injuries do not result from a disturbance of equilibrium. It will be different if this contractibility has been lost. For this reason a long-continued fixed dressing has great disadvantages; and, on the other hand, the ambulatory treatment of fractures has had good results.

We learn this same principle from every-day experience, and the same lesson is taught in hospital observations,—*e.g.*, in contracted peroneal muscles, brought on by their exercising a one-sided function for too long a time. Cases of this kind can be cured as long as no permanent pathological changes have taken place.

A continued shortening usually does not cause a disturbance of nourishment, but a continued extension often causes serious atrophy.

From these investigations it is evident that a plaster of Paris dressing in a position of rest should be employed if contractures are to be avoided.

The author defines habitual scoliosis as a disturbance of equilibrium caused by the antagonism of the long muscles of the back, brought on by an incorrect attitude in sitting. Hallux valgus and hammer toe are easily explained by the perpetual one-sided contraction of muscles. The same law is in force in talipes and flat foot, in the former the tibiales anterior and posterior and in the latter the peronei being continuously contracted. It is more difficult, however, to trace genu valgum back to a primary contraction of the biceps.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

65. Advances in the Treatment of Paralytic Deformities. By A. H. Tubby. *The Lancet*, London, March 28, 1903.

Tubby discusses the treatment of paralytic deformities following infantile paralysis or anterior poliomyelitis or the spastic type, hemiplegia, cerebral diplegia, and those due to injuries of the nerves. He describes the method of tendon grafting, giving its history. The rationale is to utilize what is ill-directed voluntary movement, and restore the balance of muscle as far as possible in the affected part, so that the active muscles are not brought to work against the enfeebled ones, thus producing deformities. The brain, he thinks, becomes readily aware of the new conditions of movements by education. The methods and technique of operation are described. He calls attention particularly to the necessity of reshaping the joint surface in old cases and putting the foot or the limb in fully corrected position, and to leave no tension of the reinforcing muscle. Arthrodesis is useful in some ankylosed joint cases; but he does not believe in its propriety in the knee, because the long, straight shaft of the bone so formed is inconvenient, brittle from paralytic changes, and liable to fracture. He would prefer to use mechanical supports with a ring-catch at the knee joint or to transplant portions of the fascia from the sides and back of the joint into the patella. At the ankle, however, it is a valuable measure, because it gives a suitable

basis of support. In spastic paralysis the whole secret of success of tenotomy consists in preventing elongation of the bond of union and carefully guarding it until equilibrium of the opposing groups of muscles has been established. If there is fair intellectual development and no fits, it results in nothing else but good physically and mentally, because the more these patients are able to get about and be in touch with others, the more they improve. In cases where it is possible to restore the continuity of the nerve, muscle grafting is the method for overcoming the difficulties; and he reports a case in point.—*Abst. Jour. Am. Med. Ass'n.*

66. On the Position of the Tendo Achillis by Different Positions of the Feet and by Contraction of the Calf Muscles. By Dr. L. Athabegian (Schuscha). *Archiv für Orth.*, Bd. I. Heft 1.

Dr. Athabegian in this paper discusses the literature of the subject, the technique employed in measuring, and the different points measured, length of tibia and tendo Achillis, the relation of the insertion of the tendo Achillis to the ankle joint in the different positions of the foot, and the changes of the relations of tendo Achillis in various positions of the foot and knee. The article is copiously illustrated by drawings, figures, and tables of measurements.—*D. Townsend, Boston.*

MISCELLANEOUS.

67. Clinical and Experimental Contribution to the Study of the Lesions of Traumatic Origin, of the Brachial Plexux (pp. 1–33). By R. Galeazzi. *Arch. di Ortopedia*, Milano, 1903, xx. fasc. 1.

The cases observed were: (1) a syndrome of Déjérine-Klumpke, provoked by a wound of the neck; (2) gunshot wound in the left carotid region with lesion of the vagus and the brachial plexus; (3) luxation, by rotation to the left, of the fifth cervical vertebra with an elevated position of the articular apophysis; paralysis of the brachial plexus of complex type, but generally extreme; (4) luxation, with rotation to the right, of the third cervical vertebra, with its straddling the articular apophysis; paresthesia from compression of the fourth cervical root; reduction; recovery.

The paresis and muscular paralysis may be explained by stretching or direct compression from the luxated vertebræ or by the quite abundant extra-medullary extravasations. In almost all these cases there were symptoms of medullary lesion with those of the radices, so that it is difficult to distinguish the spinal lesions from those of the radices. Few cases have been described where the root symptoms were as clear as in these. From them it would result that it is possible for a paralysis of the roots to arise from the same cause which produces the luxation of the cervical vertebræ; that is, constant compression. This is confirmed by the clinical histories and on observations on the cadavers, and is also evident in the preparations of luxations which the author has been able to observe. The few surgical interventions recorded give encouraging results. The difficulty is in finding the seat of the lesion and determining its degree.

68. Orthopedic Surgical Treatment of Paralysis of the Radial Nerve (pp. 42–56). *Arch. di Ortopedia.* By Alessandrini.

Most cases of paralysis in children come from poliomyelitis. In the statistics of Kermisson, of 179 cases of infantile paralysis, only 16 are referred to the upper articulation. This agrees with other authors. In Alessandrini's cases he found only 2 cases of the superior articulation out of about 70 cases. Much credit is due to Drobnik, who practised a transplantation in a case of partial paralysis of the radial nerve; and Alessandrini has treated this question amply in his communication: "Interosseous Retrograde Transplantation of the Long Extensor of the Hallux in 'Pes Valgus Paralyticus.'"

A boy of five years entered August 19, 1902. Six months old, he had been attacked by an intense fever, after which he lost completely the motility of the arm and right leg. In time there was some amelioration. At present there is a tendency to recline head to the left and roll it to the right; right foot in pure equinus position; the right is pressed to the body and in internal rotation; the fore arm and hand in manifest pronation; extension impossible, some flexion. Operation August 26, 1902: Alessandrini isolated almost all of the longus palmaris with median incision, then passed between the deep flexor of the fingers and the long flexor of the thumb, prepared the interosseous ligament, which he split, avoiding the artery and the interosseous nerve. He then dissected with median dorsal incision the common extensor of the fingers; and, passing between the abductor and the long extensor of the thumb, he prepared the interosseous ligament of the dorsal side. The tendon of the longus palmaris was then cut above the transverse ligament of the carpus, and, passing it through the interosseous ligament, it was fixed in a boutonnière of the common extensor of the fingers above the point where this muscle untwists into its tendons, but quite a space above. The part above the tendon he divided into two, the first of which he fixed with sutures to the tendons of the common extensor of the fingers and anastomosed, the other with the long abductor of the thumb. He took care to avoid the shortening of the tendons, and applied an apparatus which kept the hand hyper-extended and in supination and the fore arm flexed to the arm with that in exaggerated supination. The result was most favorable. The sutures were removed on the twenty-eighth day, and electricity and massage used daily, keeping the hand in super-extension from sitting to sitting by apparatus. The patient was dismissed in about two months with the function re-established *in toto*. A month after the result was maintained.

69. Suture of the Brachial Plexus for Birth Palsy. *British Medical Journal*, February 7, 1903.

Kennedy states that many of these cases recover without treatment. Many, however, fail to recover; and he is doubtful as to the efficacy of electrical treatment in birth palsies, though electricity is of undoubted value for diagnostic and prognostic purposes. He holds that the only rational way to treat birth palsies is that of injuries to peripheral nerves in general. No operation should be attempted until sufficient lapse of time has occurred to determine whether electric reactions will indicate an approaching recovery of the muscles. By the time the child is two months of age, ordinary electric reactions of the child's muscles are sufficiently stable to determine whether the nerve and muscles properly respond. If after this age there be no response to the faradic current, although of course the galvanic current evokes good contractions, it is safer to proceed with operation than to put it off in the further hope of recovery. Comparatively few secondary operations on the brachial plexus are reported, and in most of these the subsequent history of the cases is not given. The author has operated on three cases, but in only one has sufficient time elapsed for recovery to be well advanced. In this case, commencing restoration was first noticed about twelve weeks after the operation, and now after nine months' recovery is almost complete. The operation is described in detail. The author advocates exposing the cords of the brachial plexus, following them in the region where the injury is probable, breaking up all adhesions. If masses of cicatrices have occurred in the injured nerves, these should be resected, and the severed cords approximated by sutures. [A. B. C.]—*Abst. Am. Med.*

70. On the Relation between the Supra-renal Glands and the Growth of the Body to Gigantic Proportions. By Tinser. *Bruns. Ess.*, vol. 37, p. 182.

Of the "blood glands," the thyroid, the hypophysis, the thymus, and the testicle have been known for some time to exert an influence in anomalies of growth. The author now points out that the supra-renal has also an influ-

ence of this kind. He reports an observation of his own, and gives a review of other published cases.

In the Tübingen hospital there was a boy of five and a half years, weight 39 kg. (86 pounds), height 138 cm. (4 feet 7¼ inches), making him appear to be about fifteen years old.

Post mortem.—A tumor of the left supra-renal gland nearly the size of a child's head was found. The histological examination seemed to show an epithelical neoplasm of the type of malignant adenoma. An extirpation during laparotomy was impossible on account of the numerous metastases involving the inferior vena cava.

The patient had suffered only one year before his death with headache and pain in the left side of the abdomen. The author concludes that the blood glands, as a whole, are in close connection with one another, and may be supplementary to each other, a certain reciprocity existing between them. He thinks that all of them may influence the growth of the body, their hypertrophy having connection with gigantism, and their atrophy with pygmean growths.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

71. **On Angiosclerosis of the Iliac Veins, with a Paper on the Treatment of Temporary Intermittent Limping and on the Group of Symptoms.** By N. Ortner. Published by Stokes & Adam. *Collect. Clin. Papers*, New Series, No. 347.

After the discussion of a case and autopsy in a very interesting way, the author discusses the analogy between these facts and the intermittent claudication of the muscles of the lower extremities (Charcot, Erb, Goldflam). This latter is caused by an ischæmia of the affected parts of the extremities because of disease of the arteries and cramps of the arteries and veins during the movements of the limbs. The author explains the condition of his patient during abdominal digestion on the ground of an ischæmia occurring while the abdomen is engaged in its function.—*Abst. Archiv für Orth.*, Bd. I. Heft 2.

72. **A Case of Intermittent Claudication.** Dissertation, Jena, 1902. By Nierling.

The author comes to the following conclusions:—

1. The aspect of intermittent claudication is not always the same. Either the symptoms of sensation or pain and spasm may be the prevailing ones. The whole system complex is not always developed in its entirety.
2. The onset may be sudden, without any previous disturbance whatever, excited, it may be, by cold or by nervous over-exertion.
3. Changes in the foot arteries are not always to be detected by palpation or the X-ray.
4. Standing occupation seems to cause the patients more annoyance than ordinary walking.
5. Syphilis seems not to be without importance in the origin of the disease.
6. The phenomena of intermittent claudication are to be attributed to faulty blood supply of the lower extremities.
7. This is caused not by arterio-sclerosis alone, by the permanent narrowing of the vessel walls. It is very likely that a functional agent, the changing physiological function of the vessel walls, plays a very important rôle.
8. It is not impossible that the disease is a functional neurosis, a symptom of one, or a vaso-motor neurosis of this character.—*Abst. Zeitschr. für Orth. Chir.*, xi. 3.

The business manager will secure for subscribers desiring it, so far as practicable, and at the lowest possible rates, journals or books which contain the original of articles abstracted in the Journal.